
UNITED NATIONS CONFERENCE ON TRADE AND DEVELOPMENT

REVIEW OF MARITIME TRANSPORT 2011

Report by the UNCTAD secretariat

Chapter 6

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A. MARITIME BUSINESSES IN DEVELOPING COUNTRIES

1. Introduction

Forty years ago, when UNCTAD first produced the *Review of Maritime Transport*, the maritime industry as a whole was mostly located in developed countries, whereas today, developing countries have gained large market shares in many maritime businesses.¹ One example of this trend is shipbuilding – an industry that used to be dominated by members of the Organization for Economic Cooperation and Development (OECD). Today, the world's largest shipbuilding countries are China and the Republic of Korea, and the vessels built in these two countries are purchased by shipping companies worldwide. In 2001, the value of vessels exported from developed countries was higher than that exported from developing countries; however, in 2009, the total value of vessels exported from developing countries stood at \$91 billion, compared to vessel exports worth \$53 billion from developed countries (figure 6.1).

Traditionally, developed countries covered the entire maritime value chain or a large part of it, whereas

today most maritime champions in both developing and developed countries specialize in a limited number of sectors (see also annex VII for a table with each country's market share in key maritime businesses). For example, Panama and Liberia are the largest open ship registries. Containers are mostly built in China. Dubai Ports is among the largest container terminal operators, with concessions on all continents. Bangladesh specializes in ship recycling. Many ships operate with crews from India, Indonesia and the Philippines.

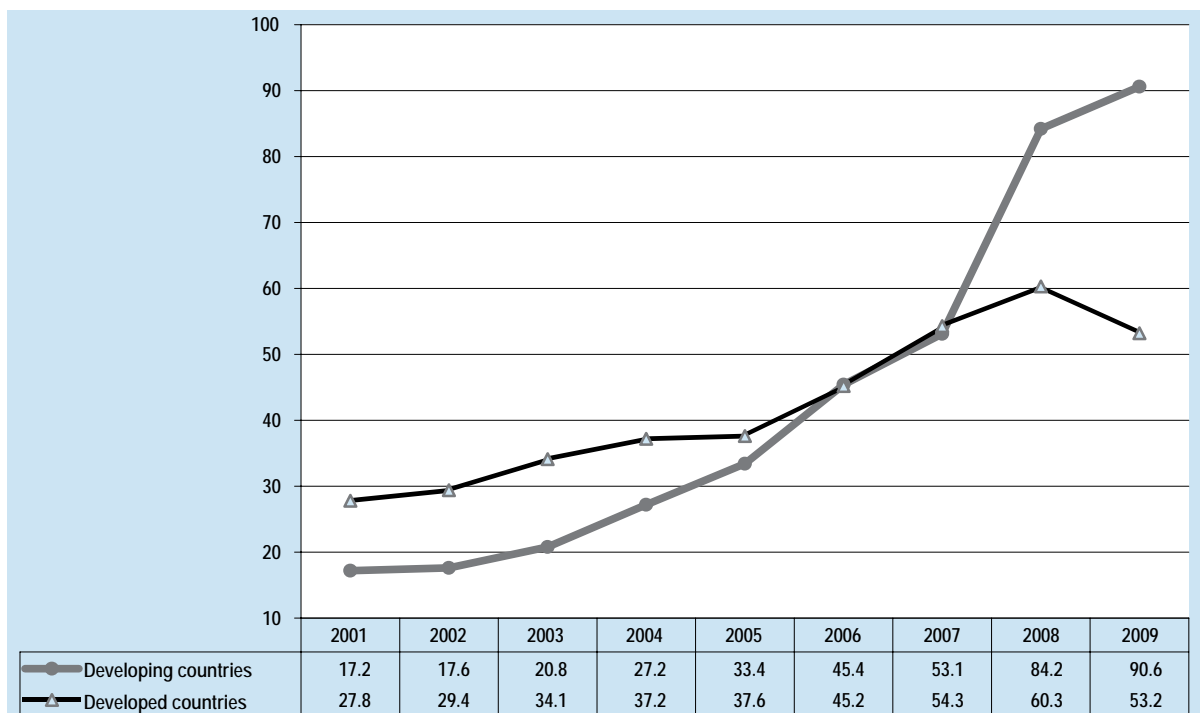
The remainder of this chapter analyses the structure, intensity, and future prospects of selected maritime sectors in developing countries.

Section A introduces the maritime sectors that fall within the scope of this chapter, and refers to the different maritime businesses along a ship's lifecycle.

In Section B, a number of key maritime sectors are described individually, and country case studies illustrate examples of the growth paths of maritime businesses in developing countries.

Section C presents a cross-sector comparison which looks at the market concentration levels and market shares of developing countries. It also discusses linkages between different maritime sectors.

Figure 6.1. Export value of ships, boats and other floating structures (in billions of dollars)



Source: International Trade Centre. Trade Map. http://www.trademap.org/tradestat/Country_SelProduct_TS.aspx (accessed in September 2011).

2. Maritime shipping

Maritime shipping comprises a large variety of different businesses, a selection of which will be analysed in this chapter. Following Porter's value chain concept, the sectors are structured in chronological order.² Porter chooses a single business unit as the appropriate level to construct his value chain. Products pass through this sequence of functions and gain value at each activity.

For the purposes of this chapter, a selection of key maritime businesses is presented along a ship's lifecycle, starting from the building of the ship and continuing until its scrapping (figure 6.2).³ The sectors are divided into (a) the core ship lifecycle industries and (b) the supporting industries, with an emphasis on container shipping. Conceptually, the object of the analysis is a cluster of maritime businesses, rather than a single business unit. The core businesses in the ship lifecycle industries include:

- (a) *Ship building*: A manufacturing industry that conceptualizes and assembles different vessel types.
- (b) *Ship owning*: The company purchases the ship through its own or external financial resources, and becomes the legal proprietor of the ship.
- (c) *Ship operation*: A ship operator is usually responsible for management of the crew, route planning, servicing and maintenance. It also takes the entrepreneurial risks related to

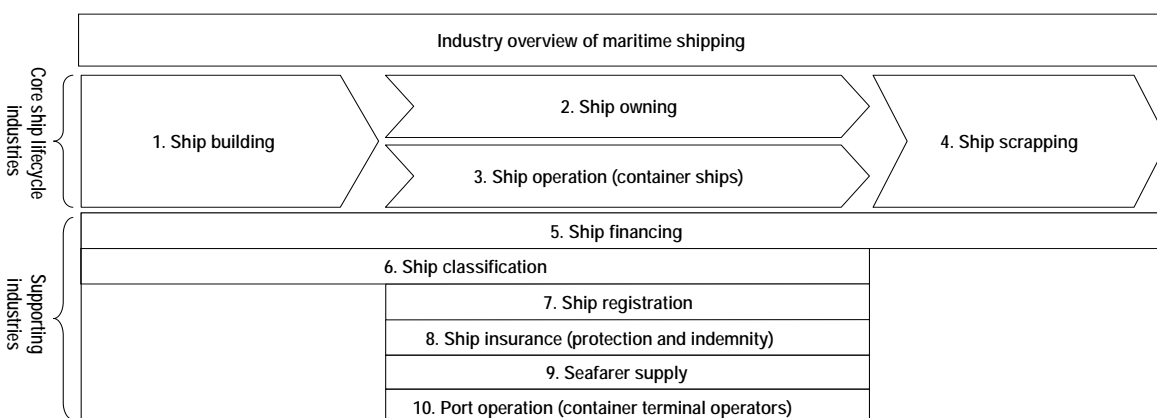
capacity utilization and operational efficiency. Particularly in the case of containerized liner shipping, operation and ownership of ships often lie in different companies.

- (d) *Ship scrapping*: Includes the breaking up of a ship at the end of its lifecycle and is often referred to as "ship recycling". The ship scrapping company mostly benefits from the reuse of the scrapped steel and some other components, although hazardous elements have to be recycled or disposed of.

During this lifecycle, the ship will require numerous support services, six of which are discussed in further detail in this chapter:

- (a) *Ship financing*: The process whereby a lender, such as a bank, provides the financial resources to a shipowning company to purchase and maintain a vessel.
- (b) *Ship classification*: Classification societies verify and certify compliance with technical rules and safety and other national and international standards for ship construction and operation. They work on behalf of the shipbuilder, the flag state, or other interested parties.
- (c) *Ship registration*: This includes the process of national registration of a ship by a country under whose flag the vessel sails.
- (d) *Ship insurance (P&I)*: This section focuses on protection and indemnity (P&I) clubs. A P&I club is a non-profit association that typically consists of

Figure 6.2. Maritime sectors along a ship's lifecycle



Source: UNCTAD secretariat.

shipowners, ship operators and ship charterers. It provides its members with mutual ship insurance services that also cover third-party liabilities, such as cargo or environmental damage.

- (e) *Seafarers*: A ship's crew consists of officers (e.g. masters and engineers) and ratings (such as able seamen, oilers and cooks).
- (f) *Terminal operators*: Terminal operators carry out the logistical processing of containers between ships and other modes of transports. Particularly in the case of container shipping, loading and unloading operations are mostly undertaken by private stevedoring companies which are often also responsible for the terminal operations, superstructure and IT systems.

Section B below examines these ten maritime sectors in more detail, and evaluates the participation of developing countries. In addition, it briefly introduces some other maritime and related businesses, such as container construction, leasing, ship repair, bunkering, brokering, and ship management.

B. ANALYSIS OF SELECTED MARITIME BUSINESSES

This section analyses the current participation of developing countries within ten selected maritime businesses. A case study from a developing country, for each sector, aims to illustrate possible growth paths and corresponding influencing factors.

1. Ship building

Most large cargo-carrying vessels are now built in developing countries in Asia, while shipyards in Australia, Europe, and North and South America specialize in smaller vessels (e.g. tugboats and offshore supply ships) or other specialized non-cargo-carrying vessels (e.g. ferries and cruise ships).

Ship building has become a highly concentrated business (table 6.1). China and the Republic of Korea together built more than 72 per cent of dwt in 2010, with China specializing in dry bulk carriers and the Republic of Korea specializing more in container ships. Japan was the third-largest player, with 22 per cent. These three major producers combined reached a market share of 94 per cent of world tonnage. The Philippines, in fourth position with a market share of 1.2 per cent, focuses on bulk carriers. Production by South-East Asian shipbuilders concentrates on small types of

ships or on specific elements of ships. Singapore, for instance, is a world leader in oil rig building.

China has emerged as the world's largest shipbuilder, and expanded its dry bulk shipbuilding capacity by a factor of six between 2008 and 2010.⁴ The country is also the world's largest importer of ship engines, with a value of \$2.4 billion in 2009.⁵ In addition to dry bulk carriers, China builds a large number of smaller ships, including tugboats and product tankers.

Country case study: The Republic of Korea expanding its product portfolio in shipbuilding

The diversification of the Republic of Korea's shipbuilding business and its competitiveness are a result of support policies for manufacturing industries at the "infant industry" stage. Such policies during the third and fourth five-year plans (1971–1981) allowed for accelerated development of the sector. To this day, the strategic importance of the sector is reflected in the structure of the country's Government, which includes a maritime affairs ministry with various supporting bodies.⁶

Table 6.2. shows the distribution of imports and exports to/from the Republic of Korea in different shipbuilding sectors. Dry cargo ships (including container ships) and passenger ships account for the largest share. The second most important sector includes the construction of light vessels, dredgers, floating docks and drill platforms. The fastest-growing export sector comprises warships and lifeboats, however these vessels remain at a comparatively low level, with a total value of \$0.5 billion in 2010.

Shipbuilding companies from the Republic of Korea are often also active in other manufacturing industries – this is the case of Daewoo, Hyundai and Samsung. The Republic of Korea is the world's sixth-largest producer of steel, which is a crucial input for ship construction.⁷ The country's Hanjin and Hyundai Merchant Marine (HMM) carriers, which are among the world's top 20 liner shipping companies, have most of their ships built in shipyards in the Republic of Korea, which specialize in container ships, offshore vessels, oil tankers, and LNG tankers.

The country's shipbuilding sector is currently confronted by rising labour costs, which it is partly able to offset by achieving constant increases in productivity. The Republic of Korea's average labour costs for the manufacture of transportation equipment tripled between 1998 (\$7.90 per hour) and 2007 (\$23.30 per hour), whereas unit labour costs had an average annual growth rate of only 1.67 per cent from 2000 until 2009.⁸

Table 6.1. Top 20 economies for shipbuilding, 2010 deliveries^a (percentage of built tonnage)

Rank		Tankers	Bulk carriers	Other dry cargo/passenger	Offshore	Others	Total 1000 dwt	Accumulated market share percentage	Number of ships
1	China	23.8	65.7	9.7	0.4	0.3	61 499	41.1	1 413
2	Republic of Korea	40.6	34.7	23.0	1.6	0.0	46 924	72.4	526
3	Japan	29.7	59.2	11.0	0.0	0.0	32 598	94.2	580
4	Philippines	12.5	64.2	23.4	0.0	0.0	1 859	95.4	34
5	Romania	12.7	60.0	16.8	9.6	0.8	897	96.0	43
6	Viet Nam	1.9	75.4	20.8	0.9	1.1	840	96.6	132
7	Denmark	0.0	97.0	3.0	0.0	0.0	751	97.1	8
8	Taiwan Province of China	0.0	0.0	99.3	0.0	0.7	661	97.5	21
9	Croatia	67.5	19.6	11.8	0.0	1.0	531	97.9	16
10	Germany	7.1	6.3	82.3	2.3	2.0	524	98.2	36
11	Turkey	58.6	18.7	16.8	4.6	1.2	497	98.6	94
12	United States	71.3	0.0	1.0	25.7	2.0	332	98.8	76
13	Russian Federation	87.6	0.0	7.5	3.3	1.5	252	98.9	30
14	Spain	15.5	0.0	19.0	21.5	44.0	225	99.1	56
15	Indonesia	12.8	27.7	13.8	40.3	5.4	180	99.2	135
16	Netherlands	2.5	0.0	49.9	16.6	31.1	174	99.3	29
17	India	29.7	41.8	21.4	1.2	5.9	136	99.4	37
18	Poland	0.0	0.0	27.8	47.1	25.1	116	99.5	52
19	Italy	3.8	0.0	68.5	22.9	4.7	116	99.6	34
20	Bulgaria	4.8	70.0	25.1	0.0	0.0	103	99.7	6
-	World	30.1	53.1	15.3	1.2	0.3	149 746	100.0	3 748

Source: Compiled by the UNCTAD secretariat on the basis of data supplied by IHS Fairplay.

^a Seagoing propelled merchant ships of 100 gross tons and above.

Table 6.2. Structure of ship imports and exports in the Republic of Korea, 2001 and 2010

Ship type	2001 Imports \$1 000	2010 Imports \$1 000	2001–2010 Increase/decrease percentage	2001 Exports \$1 000	2010 Exports \$1 000	2001–2010 Increase/decrease percentage	2001 Trade balance \$1 000	2010 Trade balance \$1 000
Cruise ships, cargo ships, barges	294 913	2 486 422	843%	8 168 147	37 073 448	454%	7 873 234	34 587 024
Light vessels, dredgers, floating docks, floating / submersible drill platforms	32 294	732 527	2268%	1 331 953	9 996 550	751%	1 299 659	9 264 023
Tugs and pusher craft	18 671	40 395	216%	159 235	54 463	-66%	-4 721	39 822
Warships, lifeboats and other rowing boats	8 634	37 381	433%	2 423	53 885	2224%	140 564	14 068
Vessels and other floating structures for breaking-up	3 463	24 973	721%	481	5 902	1227%	661	101
Floating structures (rafts, tanks, coffer dam, landing stages)	9 043	22 940	254%	10 993	4 517	-59%	-8 562	-17 038
Yachts and other vessels for pleasure or sports	7 144	14 063	197%	25 227	808	-97%	7 530	-20 456
Fishing vessels and factory ships	45	39	-13%	706	140	-80%	16 593	-36 573
Total	374 207	3 358 740	798%	9 699 165	47 189 713	387%	9 324 958	43 830 971

Source: Compiled by the UNCTAD secretariat on the basis of data from the International Trade Centre.

2. Ship owning

The three largest shipowners are developed countries, namely Greece, Japan and Germany. Together, they account for 41 per cent of the world's deadweight tonnage. China ranks fourth, with an owned capacity of 108 million dwt. While the four largest shipowning countries together control about half of the world fleet, ownership of the other half is spread among a large number of countries, including many developing countries (see also chapter 2, and in particular, table 2.5).

The order book in table 6.3 shows that China can be expected to climb the ownership ranking in the future; the country's order book ranks second in the world. As a group, developing countries have a larger order book than developed countries, suggesting a growing market for developing countries in the future.

Country case study: Largest order book in Brazilian history

The case of Brazil shows how shipowning can be linked to a country's international trade in goods.

Building on the boom in its commodity exports, Brazil is expected, in the coming years, to achieve the highest fleet growth out of the top 35 shipowning countries. Underlying this projection is the country's order book, which is the world's largest order book in relation to its current fleet (table 6.3). It is also the largest order book in Brazilian history.

As at January 2011, Brazilian shipowners had a fleet which comprised 152 vessels and had a capacity of 10.9 million dwt. At a global level, Brazil's market share is below 1 per cent, ranking twenty-third in the world. In terms of deadweight tonnage, 38 per cent of the Brazilian fleet is made up of bulk carriers and 41 per cent is made up of tankers (table 6.4). These ship types mainly serve the demand created by the country's exports such as oil and iron ore and by the offshore industry. The largest oil-producing company in Brazil is the state-owned Petrobras, which operates 172 vessels, 52 of which are owned by the company.⁹

Table 6.4 analyses Brazil's fleet in terms of ship registration. More than 70 per cent of the country's

Table 6.3. Top 20 ship orderbooks by country of ownership, 1 January 2011

Rank		Number of ships	Value (billions of dollars)	Gross tonnage (millions of GT)	GT, world percentage	GT, accumulated world percentage	GT, ownership rank	GT orderbook as a % share of the owned fleet
1	Greece	715	42.3	39.2	13.6	13.6	1	28.2
2	China	801	36.0	36.7	12.7	26.4	4	45.0
3	Japan	535	31.2	26.7	9.3	35.6	2	19.5
4	Germany	714	33.8	24.9	8.6	44.3	3	29.4
5	Republic of Korea	310	17.3	17.2	6.0	50.3	7	42.8
6	Taiwan Province of China	179	13.6	11.7	4.1	54.3	10	50.7
7	Norway	322	20.7	8.7	3.0	57.3	5	17.5
8	Turkey	251	10.2	8.1	2.8	60.2	16	52.8
9	Italy	168	9.4	6.9	2.4	62.6	8	21.3
10	Brazil	106	12.1	6.9	2.4	65.0	27	108.1
11	Denmark	201	10.0	6.7	2.3	67.3	9	22.0
12	China, Hong Kong SAR	150	6.6	6.6	2.3	69.6	11	20.0
13	Singapore	281	7.5	6.5	2.3	71.8	12	28.8
14	United States	181	20.2	6.3	2.2	74.0	6	14.4
15	Israel	81	6.9	6.2	2.2	76.2	13	39.2
16	India	138	5.4	5.1	1.8	77.9	17	41.0
17	France	132	4.8	2.6	0.9	78.8	23	28.6
18	United Arab Emirates	102	4.0	2.5	0.9	79.7	25	31.0
19	Canada	58	3.2	2.3	0.8	80.5	14	14.6
20	Netherlands	204	3.9	1.9	0.7	81.2	20	19.9
-	World	7456	376.8	287.9	100.0	100.0	-	-

Source: Clarkson Research Services. *World Fleet Monitor*. As at 1 January 2011. Seagoing cargo-carrying vessels only.

Table 6.4. Brazilian-owned fleet, 1 January 2011

	Total	Percentage of total					
		Brazil	Panama	Liberia	Bahamas	Marshall Islands	Others
Total number of ships	152	70.4	5.3	16.5	1.3	0.0	6.6
Total dwt	10 866 503	19.9	11.7	56.9	3.3	3.1	8.1
Bulk carriers, dwt	4 690 527	8.8	2.9	81.2	0.0	0.0	7.1
Cargo/passenger ships, dwt	270 289	100.0	0.0	0.0	0.0	0.0	0.0
Offshore, dwt	1 428 141	7.4	59.8	0.0	18.1	4.3	14.8
Tankers, dwt	4 466 352	30.6	6.3	53.2	2.4	6.3	7.6
Miscellaneous, dwt	11 194	59.7	0.0	0.0	0.0	0.0	40.3

Source: Compiled by the UNCTAD secretariat on the basis of data provided by IHS Fairplay.

vessels sail under the Brazilian flag. However, based on tonnage, Liberia is the most used flag for the Brazilian-owned fleet, with a share of 57 per cent. Next are the Brazilian flag (20 per cent) and the Panamanian flag (12 per cent). Large vessels such as bulk carriers and tankers are involved in international transport and are mostly listed at Liberia's registry, while offshore platforms and general cargo and passenger vessels often need to be registered in Brazil. Cabotage, for instance, can only be carried out by Brazilian-flagged vessels.

3. Ship operation

In container shipping especially, the companies that provide liner shipping services tend to own only a part of their fleet. The liner shipping companies charter in additional ships, which are then operated and deployed under their own name.

A total of 405 containership operators are reported to provide international liner shipping services. The three countries with the highest containership operating capacity (in terms of total TEU vessel capacity) are Denmark, Switzerland and France, which jointly have a market share of almost 30 per cent.¹⁰ It is also noteworthy that the largest shipowning country, Greece, is not host to any major containership operators.¹¹

Among the top 20 operating countries are 10 developing economies, which have a combined share of 37 per cent. After the selling in the 1990s of major United States liner shipping companies, it is Chilean companies which today operate the largest containership fleet in the Western Hemisphere (tables 2.6 and 6.5).

Country case study: Chilean containership operators

Chile is home to three international containership operators, which in January 2011 had a combined capacity of 449,913 TEU. Compañía Sudamericana de Vapores (CSAV) dominates the sector in Chile, with an 85 per cent share among the Chilean carriers and a ranking of tenth in the world (table 2.6). The other Chilean carriers are Compañía Chilena de Navegación Interoceánica, and Nisa Navegación (table 6.6).

As illustrated in figure 6.3, CSAV's growth has outpaced the world market for containerized cargo in recent decades. From 1981 to 2009, global transport of containerized cargo increased approximately 3.3 times faster than the world's GDP, while the cargo carried by CSAV grew almost 11 times faster during the same period. In 2009, during the economic crisis, the company lost market share. This was the year with the highest net loss in the company's history (-\$633 million). CSAV was able to generate a positive net income in 2010 (\$171 million), but in early 2011 it was again reporting losses. The Lucksic family is now a major shareholder and they are trying to accomplish a sustainable turnaround.

Founded in 1872, CSAV is one of the oldest shipping companies in the world. Initially, the company's business consisted of national coastal shipping services; these were then extended along the whole west coast of South America as far as the Panama Canal. Today, CSAV, through its subsidiary Sudamericana Agencias Aéreas y Marítimas (SAAM), also has interests in terminal operations, stevedoring, tugboats, agency and other logistics-related services in 11 countries in North, Central and South America. On the shipping side, the CSAV group includes liner companies in Brazil and Uruguay, as well as interests in dry bulk and reefer shipping.

Table 6.5. The 20 largest containership-operating economies, January 2011

Country	Total fleet			
	Vessel capacity TEU	Vessel capacity, percentage of world capacity	Accumulated market share, percentage of world capacity	Number of ships, 2010
Denmark	1 891 051	11.6%	11.6%	485
Switzerland	1 771 621	10.9%	22.5%	439
France	1 190 894	7.3%	29.9%	383
China	1 141 708	7.0%	36.9%	398
Singapore	1 117 000	6.9%	43.8%	492
Taiwan Province of China	1 113 598	6.9%	50.6%	337
Japan	1 085 802	6.7%	57.3%	296
Germany	1 025 650	6.3%	63.6%	412
Republic of Korea	906 259	5.6%	69.2%	336
China, Hong Kong SAR	661 531	4.1%	73.2%	190
Chile	449 913	2.8%	76.0%	149
United States	318 297	2.0%	78.0%	337
Israel	281 532	1.7%	79.7%	73
Kuwait	178 599	1.1%	80.8%	47
Belgium	137 090	0.8%	81.6%	163
Netherlands	132 483	0.8%	82.5%	191
Iran, Islamic Republic of	90 288	0.6%	83.0%	42
Malaysia	85 967	0.5%	83.5%	74
Italy	80 080	0.5%	84.0%	95
United Arab Emirates	69 896	0.4%	84.5%	47
World	16 253 988	100%	100.0%	9 688

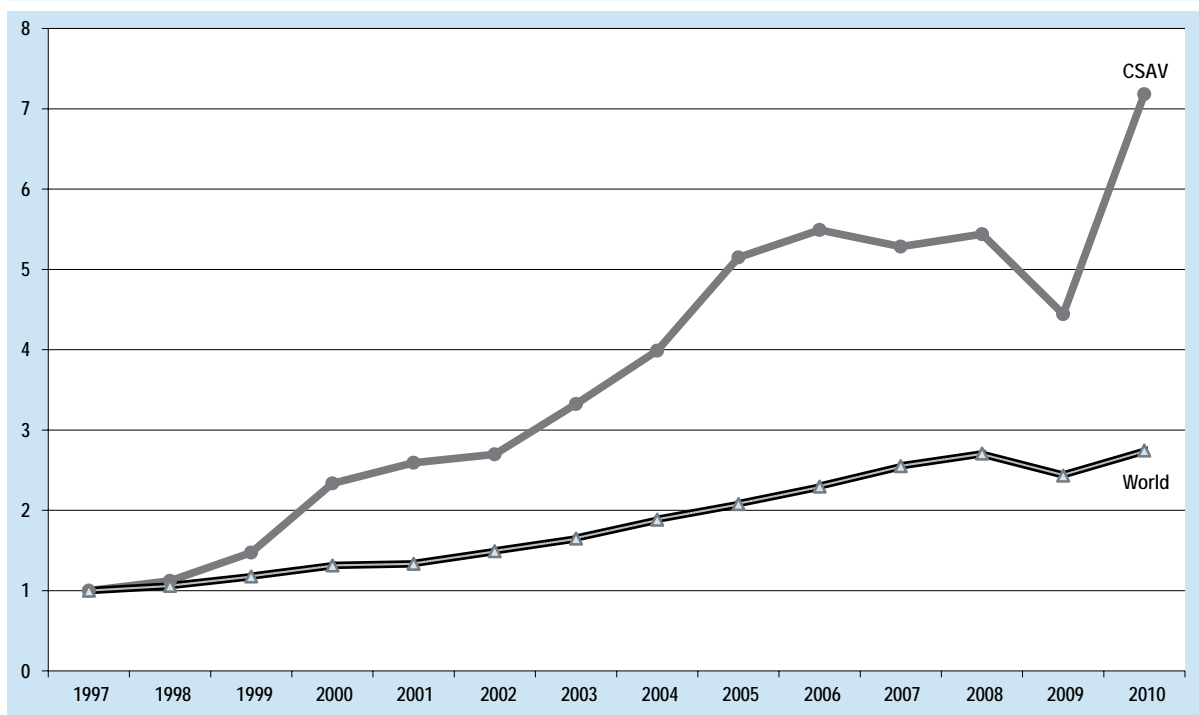
Source: Compiled by the UNCTAD secretariat on the basis of data from Containerisation International Online (accessed in March 2011).

Table 6.6. Chilean ship operators

Company	Total fleet					Order book in 2010	
	2010 Ranking position	2009 Ranking position	2010 TEU	Share of TEU, as a % of Chilean TEU	2010 Number of ships	TEU	Ships
Compañía Sud Americana de Vapores SA	10	10	382 786	85.1	119	6 316	1
Compañía Chilena de Navegación Interoceánica S.A.	28	29	65 530	14.6	27	0	0
Nisa Navegación S.A.	230	311	1 597	0.4	3	0	0
Total Chile			449 913		149	6 316	1

Source: Compiled by the UNCTAD secretariat on the basis of data from Containerisation International Online (accessed in March 2011).

Figure 6.3. CSAV index on transported TEU, 1997–2010 (1997=1)



Source: Compiled by the UNCTAD secretariat on the basis of data from various CSAV web pages, (accessed in March 2011).

With regard to its liner shipping operations, CSAV controls 80 per cent of its sales through its own 105 agencies worldwide. A specific characteristic of the company is the comparatively low share of owned ships in terms of TEU capacity; more than 90 per cent of its capacity is chartered-in tonnage. By comparison, the other top 10 liner shipping companies own almost half of their operated fleet.¹²

The expansion of CSAV has also been driven by geographical factors. With 6,435 km of coastline, extending 4,270 km from North to South, Chile had to develop long-distance national maritime transportation networks in order to reach remote regions at affordable freight rates. Chile has a high demand for maritime transport, sending 95 per cent of its exports (mostly agricultural products and copper) by sea. Owing to its geographical location, Chilean ship operators have been able to optimize the capacity utilization of vessels by loading and discharging cargo at stopovers along the coast of South America located on regional and international trade routes. Moreover, the country's containerized international trade is relatively balanced, with slightly more exports than imports, whereas other countries on the west coast of South America have a trade deficit in containerized transport.¹³ Chile adopted policies that aimed to liberalize international transport

services earlier than most other Latin American countries did, and this has given impetus for national ship operators to modernize and internationalize their businesses.

4. Ship scrapping

The competitiveness of a country's scrapping industry is mostly influenced by labour costs and the regulatory environment. All major ship scrapping countries are developing countries. Ship scrapping has reached a similar level of market concentration as ship building. The four largest ship scrapping countries covered 98.1 per cent of the activity in terms of recycled dwt in 2010 (table 6.7). India ranked first with 9.3 million dwt, followed by Bangladesh with 6.8 million dwt, and then China with 5.8 million dwt and Pakistan with 5.1 million dwt. Each of these countries is home to more than 100 companies that are involved in the ship scrapping business, through which competition is sustained within the sector.¹⁴

The types of ship scrapped vary from one country to another: India focuses on tankers (representing a 46 per cent share of its dwt) and on dry cargo and passenger ships (33 per cent share of its dwt); China

Table 6.7. Top 10 ship-scraping nations, 2010

Country	Scrapped amount, dwt	Accumulated market share, as a percentage	Number of ships scrapped	Rank	Scrapped ships, percentage of total volume				
					Bulk carriers	Dry cargo / passenger	Offshore	Tankers	Others
India	9 287 775	32.4	451	1	9.7	32.8	5.3	46.2	5.9
Bangladesh	6 839 207	56.3	110	2	15.1	5.5	5.7	71.1	2.5
China	5 769 227	76.5	189	3	46.6	36.3	2.5	12.2	2.4
Pakistan	5 100 606	94.3	111	4	8.1	2.9	6.2	80.6	2.2
Turkey	1 082 446	98.1	226	5	24.3	48.7	0.2	14.1	12.8
United States	217 980	98.8	15	6	0.0	19.9	0.0	80.1	0.0
Romania	16 064	98.9	4	7	0.0	100.0	0.0	0.0	0.0
Denmark	15 802	98.9	25	8	0.0	53.4	22.7	0.0	23.9
Japan	13 684	99.0	1	9	0.0	100.0	0.0	0.0	0.0
Belgium	8 807	99.0	12	10	0.0	100.0	0.0	0.0	0.0
World	28 637 092	100.0	1 324		18.6	22.7	4.7	50.0	4.1

Source: Compiled by the UNCTAD secretariat on the basis of data from IHS Fairplay

specializes in bulk carriers (47 per cent share of its dwt); Pakistan scraps tankers (81 per cent share of its dwt). These differences are also reflected in the average vessel sizes scrapped in the different countries – the size of the average vessel scrapped in Bangladesh is approximately 62,000 dwt, while the average size in China is 31,000 dwt.

Strong steel prices and the recovery of maritime business increased costs for ship procurement but at the same time tripled the margins in the ship scrapping business from 8 per cent in 2009 to 30 per cent in 2010.¹⁵ Indian shipbuyers left Asian scrapyards behind, with rates that were lower by about \$50 per ldt. Thus, tonnage opening up in Asia was bought by Indian shipbreakers and delivered to their yards.¹⁶

Country case study: Bangladesh reopening ship scrapping yards

Bangladesh's ship scrapping industry provides direct and indirect employment, and is also important to cover the country's demand for steel. It contributes approximately 50 per cent to the country's steel-using industries and 20–25 per cent to national steel consumption. In total, approximately 1.5 million tons are supplied by the national ship scrapping industry.¹⁷

Bangladesh's ship scrapping industry came to a halt in 2010 due to an explosion in 2009 that led to the death of four workers. The High Court forced more than 100 shipyards to stop their activities for most of 2010. Only about 20 scrapping yards that acquired certificates guaranteeing better environmental standards were

allowed to continue their operations. The result was temporary job loss for an estimated 100,000 workers who were directly or indirectly employed in the industry. Since a large proportion of the labour force working in ship scrapping is unskilled or even illiterate, these job losses especially affected the poorest households in the country.¹⁸

The court ruled that the scrapyards could reopen on 7 March 2011. The reopening of the yards can be expected to have a positive influence on the competitiveness of other heavy industries in the country, since the price of imported steel is higher than the price of steel purchased from national scrapyards. The precise way in which the reopening process and regulatory changes will proceed is still being defined.¹⁹

5. Ship financing

The economic crisis had a severe effect on ship financing. Many banks had to write off a large amount of bad assets from their balance sheets, and were very reluctant to enter into any new ship financing deals. In addition, the demand for maritime freight transport collapsed, as did freight rates and vessel values, which put pressure on shipowners' and ship operators' profit margins (see chapters 2 and 3). This led to a downturn in business in the fourth quarter of 2008, with new ship finance deals amounting to only \$14.1 billion, compared with \$33.2 billion one quarter earlier in the same year. The market began to recover in the third quarter of 2010 with a deal value of \$25.7 billion (see figure 6.4).

Restricted access to bank loans made shipbuyers seek alternative sources of funding. By way of example, bond finance volume in Asia reached \$7.49 billion in 2009 – an increase of 370 per cent over 2008. Asia accounted for 68 per cent of global shipping bond issuances, with a record value of \$11 billion in 2009. This trend continued in the beginning of 2010, with shipping companies from the Republic of Korea alone raising \$1.4 billion through bond financing.²⁰

A ranking of the largest 25 banks in ship financing indicates the limited participation by developing countries in the lending business. China is the only developing country represented, with two banks and a lending value of \$17 billion (table 6.8).²¹ The major players in the market are European banks. Germany is the largest ship financing country, hosting 8 banks with a ship finance portfolio worth \$144 billion. The United States is the only non-European developed country which has a bank in the top 25 with a lending value of \$8 billion. Ship financing in developing countries is often state-led and focuses on supporting the national maritime industry, as is the case in Brazil, China and the Republic of Korea.

Country case study: China expanding into international ship financing

The Chinese finance market is to a large extent state-controlled, with 57 per cent of all of its corporate lending provided by publicly owned commercial banks

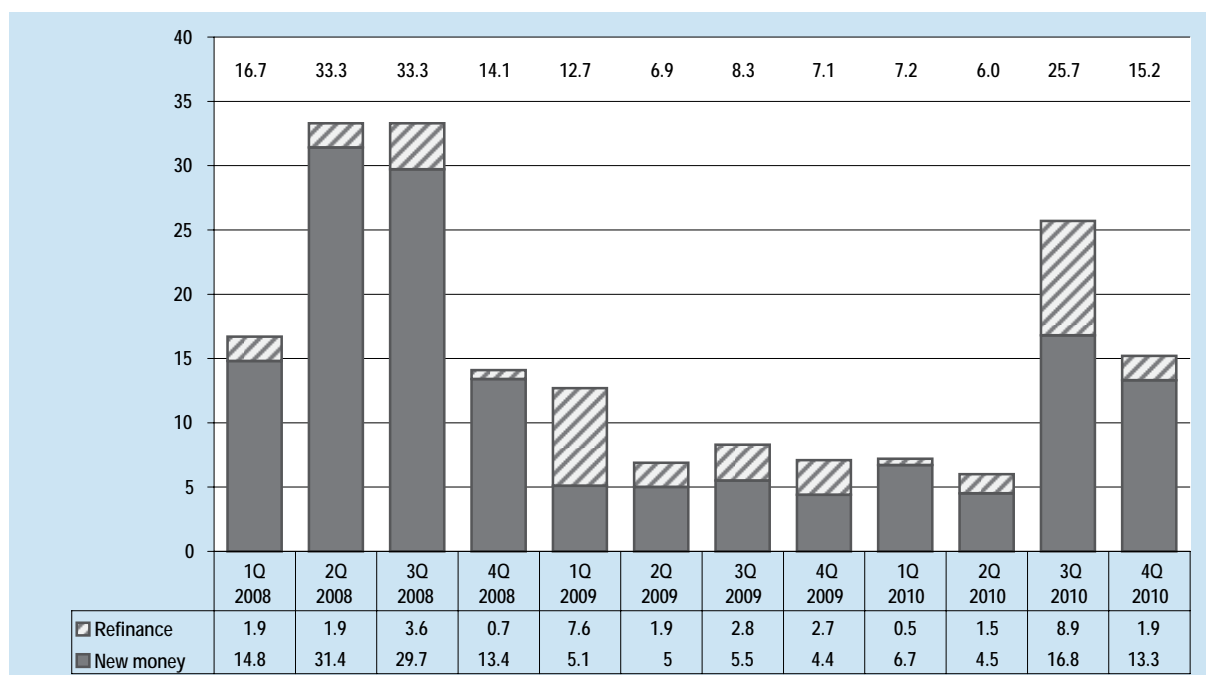
and publicly owned policy banks.²² Chinese ship financing helps with the provision of a sufficient and cheap money supply to national maritime industries such as ship construction and ship owning and operation. For instance, all of the major lenders to the largest Chinese state-controlled ship operator COSCO are publicly owned banks (table 6.9). But state lending also aims at providing loans to foreign customers of China's shipbuilding industry. For example, the Government has pledged \$5 billion for a special fund to assist Greek shipowners in accessing finance for vessels built in Chinese yards.²³

Although, on average, the volume of lending for shipping decreased by 10 per cent from 2008 to 2009 (figure based on the top 25 banks only), the Chinese bank ICBC was among the few banks to record positive growth during that period (table 6.8).

6. Ship classification

Originating in eighteenth-century England when the Register Society was created, marine classification is an activity that aims at promoting safety and environmental protection through compliance with technical standards for the design, construction and maintenance of ships. Private companies, such as shipbuilders, shipowners or insurance companies, as

Figure 6.4. Global marine finance loan volume (in billions of dollars)



Source: Data received from Dialogic Holdings plc.

Table 6.8. World's largest ship-financing banks, total lending portfolio, 2009

Bank	Country	2009 (billions of dollars)	2008–2009 increase / decrease percentage
HSN Nordbank	Germany	49.3	-8.7
Deutsche Schiffsbank	Germany	33.3	-11.5
DnB NOR	Norway	28.0	-8.0
Royal Bank of Scotland	United Kingdom	23.0	-7.0
KfW IPEX-Bank	Germany	20.3	-0.4
Nordea	Sweden	18.4	-1.1
BNP Paribas	France	18.0	6.0
Lloyds Banking Group	United Kingdom	16.9	4.7
CA-CIB	France	13.9	-4.8
DVB	Germany	13.1	-1.5
Bank of China	China	12.2	0.0
UniCredit (ex-HVB)	Italy	11.4	0.2
Danish Ship Finance	Denmark	11.3	0.0
Bremer Landesbank	Germany	9.8	-0.2
Deutsche Bank	Germany	9.5	-1.8
Citi	United States	8.0	-1.5
Danske/Focus Bank	Norway	8.0	-0.2
SEB	Germany	6.1	-0.4
Natixis	France	4.8	-0.2
ICBC	China	4.7	2.5
Fortis	Belgium	4.2	-0.9
Helaba	Germany	3.0	-0.5
Alpha Bank	Greece	2.8	0.1
Marfin Bank	Cyprus	1.9	0.0
Bank of Ireland	Ireland	1.4	-0.4
Total (25 banks)	-	333.3	-10.0

Source: Data from Marine Money. Available at <http://www.marinemoney.com> (accessed in April 2011).

well as government authorities, rely on “classification societies” for these purposes. In particular, the flag state authority will require that a marine classification society has a ship “classed” before it can be admitted for registration in the country’s national fleet.

The market for ship classification is effectively dominated by a group of service providers that are members of the International Association of Classification Societies (IACS). IACS currently has 12 members and accounts for the classification of more than 90 per cent of world tonnage. The entire classification market is estimated to be worth \$5 billion each year.²⁴ Three classification societies from developing countries are members of IACS

(China, India and the Republic of Korea) and together account for less than 15 per cent of IACS tonnage (table 6.10). The largest ship classification society is Nippon Kaiji Kyokai (Japan) with a classed tonnage in 2010 of 177 million GT. The largest provider from a developing country is Korean Register of Shipping, which has a classed tonnage of 42 million GT. Klasifikasi Indonesia ranks first among the non-members of IACS, and accounts for approximately 0.6 per cent of the global market.

Being a member of IACS brings several benefits, notably that flag states prefer to work with IACS members. IACS has also consultative status with the International Maritime Organization (IMO) and contributes to the interpretation and formulation of maritime regulations adopted by IMO member states. IACS participates in the development of classification standards for the maritime industry.

In previous years, criticism was levelled at IACS for its restrictive policies regarding entry to the organization and for a lack of transparency in the setting of classification standards. This came to an end with a European Commission antitrust investigation that wound up in 2009. The investigation led to several commitments from IACS members. Transparency on membership criteria had to be increased. In addition, IACS committed itself to integrate non-IACS members into the technical working groups and to publish all technical background documents on classification standards. Furthermore, the organization created an independent body that can settle disputes with regard to the granting or withdrawal of IACS membership.²⁵ The Indian Register of Shipping (IRS) was the first applicant to receive IACS membership after conclusion of the European Commission’s antitrust investigation.

Country case study: India joining the International Association of Classification Societies

The Indian Register of Shipping is a relatively small classification society, which in 2009 classified 961 ships totalling 7.6 million dwt. Its world market share is approximately 0.8 per cent.

IRS applied for membership of IACS in 1991, and was initially given associate member status. This was converted into full membership in 2010. Previously, most Indian shipowners went through a dual classification process, with approval from an IACS member and from IRS.²⁶ With full IACS membership, IRS can now provide all necessary services and can grow its classification business in foreign markets more easily.

Table 6.9. Lenders to COSCO (in billions of yuan)

Bank	Committed credit	Shareholder	Amount drawn	Balance
China Merchant Bank	6.6	public	2.8	3.8
Agricultural Bank of China	8.7	public	3.5	5.2
Bank of China	11.0	public	6.1	4.9
Bank of Communications	6.5	public	0.8	5.7
China Everbright Bank	0.5	public	0.0	0.5
China CITIC Bank	3.3	public	0.6	2.7
Bank of Construction	3.0	public	0.6	2.4
Shenzhen Development Bank	1.2	public	1.2	0.0
Industrial and Commercial Bank of China	1.4	public	0.7	0.7
Other lenders	8.8	-	4.6	4.2
Total	51.0		21.1	29.9

Source: Data from Marine Money. Available at <http://www.marinemoney.com> (accessed in April 2011).

Table 6.10. Top 20 classification societies, 2010

Society	IACS member	Average ship age in years	Number of ships	Millions of GT	GT share, percentage	Accumulated GT share, percentage	2006 millions of GT	Increase in GT 2006–2010 percentage
Nippon Kiji Kyokai	Yes	10.8	7 000	177.3	18.4	18.4	144.5	22.7
Lloyd's register	Yes	15.3	6 433	155.4	16.1	34.5	132.4	17.4
American Bureau	Yes	15	7 351	152.5	15.8	50.4	110.1	38.5
Det Norske Veritas	Yes	12.9	4 831	141.3	14.7	65.0	113.5	24.5
Germanischer Lloyd	Yes	12.7	5 763	93.9	9.7	74.8	62.8	49.5
Bureau Veritas	Yes	13.1	6 385	73.0	7.6	82.4	53.1	37.5
Korean Register	Yes	14.5	2 023	42.1	4.4	86.7	29.7	41.8
China Class	Yes	13.1	2 220	42.0	4.4	91.1	26.9	56.1
Registro Italiano	Yes	19.4	2 020	28.0	2.9	94.0	20.2	38.6
Russian Register	Yes	25.3	3 214	13.5	1.4	95.4	14.3	-5.6
Indian Register	Yes	16.1	961	7.6	0.8	96.2	7.9	-3.8
Klasifikasi Indonesia	No	20.4	2 984	5.2	0.5	96.7	4.3	20.9
Vietnam Register	No	14.4	893	3.9	0.4	97.1	2.8	39.3
Polski Rejestr	No	30.3	366	2.7	0.3	97.4	3.3	-18.2
Hellenic Register	No	30	418	2.3	0.2	97.7	2.7	-14.8
Türk Loydu	No	27.1	613	1.5	0.2	97.8	1.5	0.0
Croatia	Yes	32.4	208	0.9	0.1	97.9	1.1	-18.2
Bulgarian Register	No	32.8	148	0.7	0.1	98.0	1.1	-36.4
China, Corporation	No	25	37	0.3	0.0	98.0	0.7	-57.1
Russian River	No	33.9	111	0.3	0.0	98.0	0.3	0.0
Total	-	15.3	53 979	944.4	98.0	98.0	733.2	28.8
World Fleet	-	21.1	83 670	963.3	100.0	100.0	726.2	32.6

Source: Clarkson Research Services. World Fleet Monitor. As at 1 January 2011.

The case of India's classification society suggests that having access to a national market of considerable size facilitates the process of admission to IACS. This allowed IRS to build up expertise and sufficient organizational size and experience in order to meet the exacting IACS membership criteria.²⁷

7. Ship registration

The four largest vessel registries are in developing economies: Panama, Liberia, the Marshall Islands, and Hong Kong (China). Together, these four territories provide their flag to 47.5 per cent of the world fleet (in dwt, see table 2.7 in chapter 2). These are "open registries", which also provide registration services to non-national shipowners and ship operators. Over time, there has been a significant rise in the share of foreign-flagged tonnage, which indicates the competitiveness and increasing relevance of this type of registry in the business (see also figure 2.4). Thus, the major ship registries in developing economies have grown at the pace of the global fleet or faster than it. Liberia, the Marshall Islands and Hong Kong (China) have seen annual growth of approximately 10 per cent between 2006 and 2011.

A recent cost comparison of major open registries, undertaken by Combined Maritime Limited, concluded that no flag offers the lowest fees for all vessel types, sizes and ages.²⁸ Accordingly, different registries specialize in different market segments (see also figure 2.5).

Many of the countries that have established open registries are also important providers of other services (including offshore banking), or have attracted company headquarters by offering low corporate tax rates. These include several small island developing States, which may find in ship registration a source of income that their geographical location and small population could not otherwise provide.

Running an open registry implies relatively high fixed costs to maintain a network of offices. In addition, strategic partnerships with classification societies have to be built up. This has prevented major newcomers in this business in recent years. Registration fees need to be kept competitive in a market where shipowners can change their vessel's flag relatively easily. It is also important to run a registry on high safety standards in order to avoid port state control inspections or higher insurance premiums for shipowners.

Entering the business of vessel registration in practice requires close cooperation with partner firms in

developed countries. The registry of Panama, for example, has received technical assistance from the Government of Japan; and the registries of Liberia and the Marshall Islands are both effectively managed by companies based in the United States. Also, the certification of ships is usually outsourced to foreign classification societies.

Country case study: Panama, the world's first open registry

Panama is the largest provider of ship registration services, with a market share of 21.9 per cent of the world's dwt. Panama's ship registration services experienced an annual growth rate of 7.4 per cent between 2006 and 2011. The structure of the ship types registered in Panama, which is dominated by dry bulk carriers and oil tankers, has not undergone significant changes in the past fifteen years (figure 6.5).

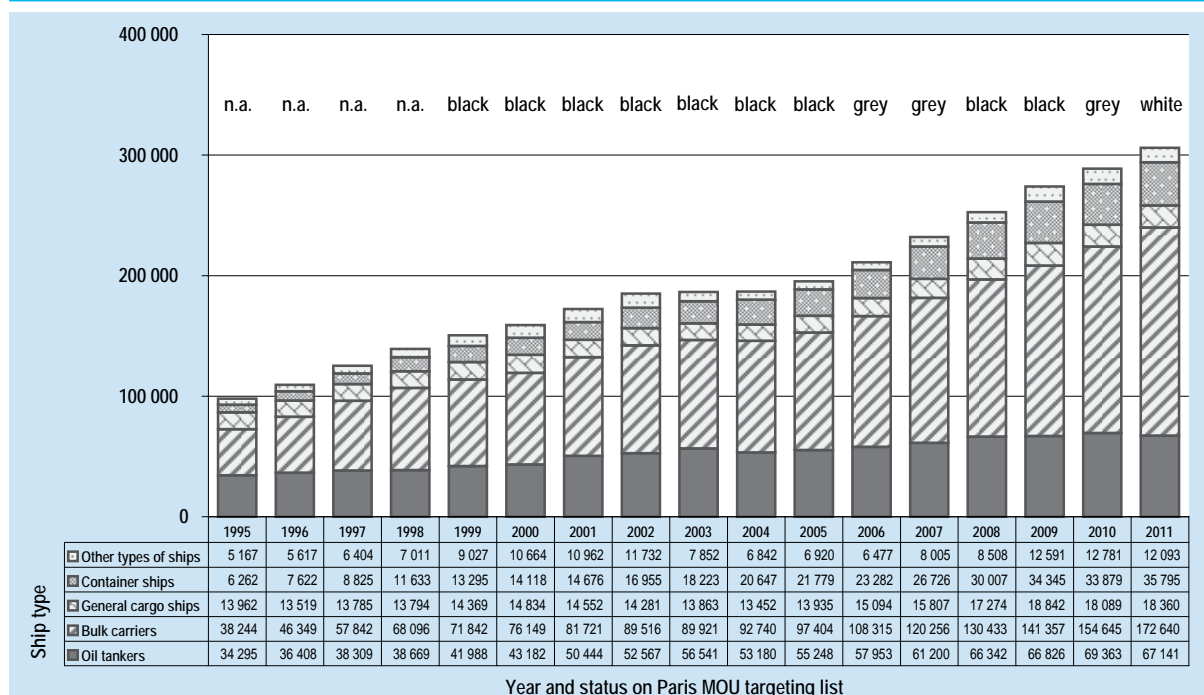
Panama was the first modern open registry. It was set up in 1917, and mostly targeted owners from the United States. At that time, the geographical location near the United States-administered Panama Canal, with a large amount of ship traffic and therefore contact with potential customers, may have been a comparative advantage. Benefiting from a first mover advantage, the country established consular networks and built up cooperation with classification societies, shipowners and nautical schools. This allowed Panama to provide round-the-clock services at competitive prices.

Panama has recently moved up to the white list of the Paris Memorandum of Understanding on Port State Control (Paris MOU) regime.²⁹ Inclusion on the white, grey or black list of the Paris MOU reflects the results of random ship inspections. Inclusion on the white list implies that Panama-flagged ships are less likely to be found with deficiencies. For shipowners who have registered their ships in Panama, it means that their vessels are less likely to be physically inspected when calling at European ports.

8. Ship insurance (protection and indemnity)

The global maritime liability insurance market is highly concentrated in developed countries, and mostly in the hands of the 13 members of the International Group of P&I Clubs (IGP&I) which accounts for approximately 90 per cent of the world's seagoing tonnage.³⁰ Private companies that offer fixed-premium insurance

Figure 6.5. Panama-registered fleet, 1995–2011 (in thousands of dwt)



Source: Compiled by the UNCTAD secretariat on the basis of data supplied by IHS Fairplay.

policies struggle to compete with the P&I clubs. Only a few relatively small players manage to grasp some market share, such as British Marine, whose size is comparable to the tonnage of the American Club of Shipowners (based on entered GT) – the smallest P&I club in the International Group.

Each P&I club is an independent, not-for-profit, mutual insurance association that provides risk coverage for its shipowner and charterer members against third-party liabilities including personal injury to crew, passengers and others on board, cargo loss and damage, oil pollution, wreck removal and dock damage.

P&I clubs often accept members from beyond their head-office country. For instance, almost half of the tonnage in the UK P&I Club is from Asian members, and two thirds of the members of the Japan P&I Club are, in terms of dwt, are from the Americas (table 6.11).

As not-for-profit organizations, the P&I clubs invest savings on behalf of their members. Clubs also provide a wide range of services to their members on claims, legal issues and loss prevention, and often play a leading role in the management of casualties. Mutual insurance associations depend on a large membership to spread the risk.

The main entry barrier to new shipping insurance companies lies in the large reserves that need to be

built up to avoid having to look for reinsurance on the open market at relatively high costs. In addition, building up reserves requires financial commitment from the new members. Comparing the \$14 million reserves of the Korea P&I Club with the \$1.9 billion of Gard illustrates the finance gap between large and small P&I clubs. The P&I clubs that are members of the IGP&I can also share claims exceeding \$8 million, arrange reinsurance programmes, and negotiate contract terms at a competitive price level.³¹ The established P&I clubs can rely on a worldwide network of offices that are familiar with the local regulatory framework and are in a position to deliver legal advice. With their historical data and accumulated experience, established P&I clubs have the required capacities to assess the fleets of new and existing members and to maintain a balanced risk structure among members.

The location of the headquarters of today's major clubs is mostly driven by historical reasons and from cluster benefits that stem from being close to banks, insurance companies, law firms and other marine service providers. Only a few developing – or even developed – countries are in a position to offer a comparable competitive setting. However, the following country case studies, which look at China and the Republic of Korea, show that new

Table 6.11. Membership of the International Group of P&I Clubs

P&I club	2008 Entered tonnage, 1 000 GT	2010 Entered tonnage, 1 000 GT	Share of entered tonnage, percentage	2009/10 Calls and premiums, \$ million	GT by nationality of management as percentages				
					Europe	Asia	Africa (Middle East)	Americas	Others/ not defined
American Club	13 300	15 283	1.4	115.7	58.2	22.8	1.6	13.6	3.8
Britannia	129 000	138 000	12.6	289.6	41.7	48.9	2.6	6.4	0.4
Gard (Norway)	170 100	184 900	16.9	447.6	68.0	22.0	0.0	10.0	0.0
Japan P&I Club	96 080	102 030	9.3	231.0	0.0	24.4	3.1	67.8	4.7
London Steam-Ship	40 156	40 615	3.7	121.0	64.0	29.0	2.0	3.0	2.0
North of England Club	90 000	114 400	10.4	285.1	44.0	26.0	14.0	10.0	6.0
Shipowners (Luxembourg)	15 614	16 933	1.5	174.2	31.0	36.0	9.0	24.0	0.0
Skuld (Norway)	91 142	n.a.	0.0	255.4	63.0	28.0	2.0	7.0	0.0
Standard (Bermuda)	73 020	110 000	10.0	250.3	50.0	20.0	0.0	22.0	8.0
Steamship (Bermuda)	71 800	82 800	7.6	305.4	30.1	40.1	9.0	20.8	0.0
UK P&I Club	161 000	176 500	16.1	447.2	46.0	36.0	0.0	12.0	6.0
West of England	69 700	68 800	6.3	239.6	45.6	33.0	8.3	13.1	0.0
The Swedish Club	37 930	45 300	4.1	78.7	45.0	54.0	1.0	0.0	0.0
Total (available data)	1 058 842	1 095 561	100.0	3 240.8	44.4	32.0	3.6	17.1	3.0

Source: Willis Group. *Protection and Indemnity: Market Review 2010/2011*. Available at <http://www.willis.com/Documents/Publications/Industries/Marine/AnimatedPDF/dec2010/index.html> (accessed in September 2011).

market players from developing countries are emerging which have the potential to grab market share from the established P&I clubs of the International Group.

Country case study: China and the Republic of Korea strengthening their P&I business

As developing countries expand their own banking, insurance and services sectors, it is to be expected that, at some point in time, shipowners will consider it beneficial to be members of local clubs closer to home or in which most fellow members have similar interests and backgrounds. In recent years, several developing countries in Asia – notably China and the Republic of Korea – have built up their own P&I clubs. The China P&I Club and the Korea P&I Club are both willing to join the IGP&I. Reportedly, formal approval of the China P&I Club joining IGP&I is expected in February 2012, and observers anticipate that the Korea P&I Club will be approved in the near future too.³²

The China P&I Club, which was set up in 1984, hosts members from China, Hong Kong SAR, Singapore, and elsewhere in Asia. The club holds a free reserve of around \$355 million, and it insures some 24 million GT. Compared to the UK P&I Club's 176.5 million GT,

this is still a relatively small account. The Korea P&I Club comprises more than 900 ships with around 9 million GT, and at the end of 2010 had free reserves estimated at \$14 million.³³

9. Seafarer supply

The 20 biggest suppliers of seafarers, as per the definition of the Baltic and International Maritime Council (BIMCO), are displayed in table 6.12. This table covers two different employment groups: officers and ratings.

Seven out of the ten biggest suppliers of ratings are developing countries. China ranks first with 90,295 ratings and a share of 12.1 per cent, followed by Indonesia with 61,821 ratings.

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 with 57,688 officers (2010 figures); China comes second with 51,511 officers. Next is India, with 46,497 officers employed. Taken together, these three countries account for one quarter of the world's supply.

Table 6.12. The 20 biggest suppliers of officers and ratings in 2010

Country	Number of officers supplied	Market share officers, percentage of world	Accumulated market share, percentage of world	Country	Number of ratings supplied	Market share ratings, percentage of world	Accumulated market share, percentage of world
Philippines	57 688	9.2	9.2	China	90 296	12.1	12.1
China	51 511	8.3	17.5	Indonesia	61 821	8.3	20.4
India	46 497	7.5	24.9	Turkey	51 009	6.8	27.2
Turkey	36 734	5.9	30.8	Russian Federation	40 000	5.4	32.5
Ukraine	27 172	4.4	35.2	Malaysia	28 687	3.8	36.4
Russian Federation	25 000	4.0	39.2	Philippines	23 492	3.1	39.5
United States	21 810	3.5	42.7	Bulgaria	22 379	3.0	42.5
Japan	21 297	3.4	46.1	Myanmar	20 145	2.7	45.2
Romania	18 575	3.0	49.1	Sri Lanka	19 511	2.6	47.8
Poland	17 923	2.9	52.0	United States	16 644	2.2	50.0
Norway	16 082	2.6	54.5	India	16 176	2.2	52.2
Indonesia	15 906	2.5	57.1	Honduras	15 341	2.1	54.3
United Kingdom	15 188	2.4	59.5	Cambodia	12 004	1.6	55.9
Canada	13 994	2.2	61.8	Viet Nam	11 438	1.5	57.4
Croatia	11 704	1.9	63.6	Italy	11 390	1.5	58.9
Myanmar	10 950	1.8	65.4	Ukraine	11 000	1.5	60.4
Bulgaria	10 890	1.7	67.1	Pakistan	9 327	1.2	61.6
Viet Nam	10 738	1.7	68.8	France	9 316	1.2	62.9
Greece	9 993	1.6	70.5	Egypt	9 000	1.2	64.1
Republic of Korea	9 890	1.6	72.0	United Kingdom	8 990	1.2	65.3
World	624 062	100.0	100.0	World	747 306	100.0	100.0

Source: Compiled by the UNCTAD secretariat on the basis of data supplied by BIMCO in *Manpower Update* (2010).

The evolution confirms the changing role of developing nations in this business. Developing countries now supply crews with broader and higher educational profiles. Notably, Cambodia and Myanmar (two LDCs) are among the major suppliers, with Myanmar in the top 20 for supply of officers. This suggests that the education of seafarers is also a development opportunity for LDCs, providing access to foreign currency revenue.³⁴

Country case study: Philippines becoming the world's largest supplier of maritime officers

The Philippines is a typical example of an economy that has diversified its maritime industry. According to the Philippine Overseas Employment Administration (table 6.13), approximately 330,000 Philippine seafarers were employed on maritime vessels in 2009 (note that this is not fully comparable with the data provided by BIMCO, which only includes seafarers currently registered and licensed in accordance with the IMO STCW convention).

According to the Philippine Joint Manning Group, almost 30 per cent of the world's employed seafarers come from the Philippines, and this group has set a target of increasing the share to 50 per cent in 2016.³⁵; ³⁶ The territory of the Philippines comprises 7,107 islands and 36,289 km of coastline, which historically has led to high national levels of demand for seafarers. In addition, the Philippines has invested in an educational infrastructure of 100 maritime academies which graduate some 40,000 seafarers each year. In addition, there are 421 licensed crewing agents in the country.³⁷

This sector is also important to the country's economic welfare. Out of the \$16 billion generated by Philippine nationals employed outside the country, \$7 billion is contributed by seafarers.³⁸ Remittances from workers employed overseas prevent up to 3 million Philippine nationals from falling below the poverty line.³⁹

Table 6.13 specifies the flags employing Philippine seafarers. Panama is first, employing 67,000

Table 6.13. Top 10 flags employing Philippine seafarers, and top 10 occupations of Philippine seafarers

Country	2007	2008	2009	Occupation	2007	2008	2009
Panama	51 619	53 912	67 362	Able Seaman	31 818	34 563	45 338
Bahamas	29 681	29 177	36 054	Oiler	19 491	20 941	27 483
Liberia	21 966	21 632	29 796	Ordinary Seaman	17 355	18 715	23 737
Marshall Islands	9 772	11 859	18 068	Chief Cook	7 778	9 022	12 651
Singapore	10 308	12 130	15 674	Second mate	7 873	8 694	12 119
Malta	7 513	11 025	14 786	Bosun	7 737	8 603	11 555
Norway	8 188	8 883	11 447	Messman	7 810	8 320	10 536
United Kingdom	8 172	8 232	10 313	Third engineer officer	7 056	7 995	11 307
Cyprus	7 052	7 446	9 425	Third mate	6 559	7 349	9 857
Netherlands	7 017	7 796	9 281	Second engineer officer	6 369	6 878	9 557
Total top 10	161 288	172 092	222 206	Total top 10	119 846	131 080	174 140
Total	226 900	244 144	329 728	Total	226 900	244 144	329 728

Source: Compiled by the UNCTAD secretariat based on data from the Philippine Overseas Employment Administration.

Note: Data not fully comparable with that in table 6.12.

Philippine seafarers, followed by the Bahamas with 36,000 and Liberia with 30,000. But flags from developed countries are in the top 10 list too – such as Malta, the Netherlands and the United Kingdom. The total number of Philippine seafarers employed has experienced continuous growth, with an increase of 45 per cent between 2006 and 2009.

10. Port operation (container terminal operators)

With the increased containerization of manufactured goods trade, and the extended use of transshipment “hubs”, containerized port traffic has grown at high annual rates (see also chapter 4). Today, containerized port traffic is mostly handled by global operators, many of which are companies from developing countries. Table 6.14 lists the world’s largest container terminal operators. The three largest service terminal operators are Hutchison Port Holdings (HPH), APM Terminals, and the Port of Singapore Authority (PSA). Together they handle about 34 per cent of the world’s container traffic.

None of the major container terminal operators entered the business as a complete newcomer. Several of them were initially operating in a home port and subsequently took on concessions in foreign ports; this is the case of HPH and PSA, coming from two of the world’s busiest container ports, namely Hong Kong (China) and Singapore. Other operators

were linked to a shipping company that initially focused on dedicated terminal operations for the mother company. Today, the distinction is becoming less relevant. APM Terminals, for example, although belonging to the same group as the Maersk shipping line, provides services to all shipping companies.

Country case study: United Arab Emirates: Recovery of Dubai Ports World from the economic crisis

The case of Dubai and port operator Dubai Ports World (DP World) is an example of a logistics provider expanding its operations abroad. DP World started taking on concessions in foreign ports slightly later than most of its main competitors. Its growth was partly realized through the purchase of P&O from the United Kingdom in 2006, which at that time was the world’s fourth-largest ports operator. Today, DP World operates around 50 terminals in more than 30 countries.⁴⁰

DP World has realized relatively stable profits during the past four years, managing to preserve them despite a fall in TEU throughput of 7.9 per cent between 2008 and 2009, which was still better than the total world decline of almost 10 per cent.⁴¹

One reason for the company’s resilience to economic turbulence lies in its geographical presence, which is evenly spread over all continents, with a focus on the Middle East (figure 6.6). DP World has grown faster than the market during the economic recovery that began in 2009, increasing its market share to

Table 6.14. Top 20 port operators, 2009

	Name	Economy	Country Type	Throughput (millions of TEU)	World percentage	Terminal capacity (millions of TEU)	World terminal capacity as a percentage
1	HPH	China, Hong Kong SAR	DC	64.2	12.2	93.9	12.5
2	APMT	Netherlands	IN	56.9	10.9	105.4	14.0
3	PSA	Singapore	DC	55.3	10.5	84.4	11.2
4	DPW	United Arab Emirates	DC	45.2	8.6	63.1	8.4
5	Cosco	China	DC	32.5	6.2	68.1	9.1
6	MSC	Switzerland	IN	16.4	3.1	23.6	3.1
7	Eurogate	Germany	IN	11.7	2.2	21.1	2.8
8	Evergreen	Taiwan Province of China	DC	8.6	1.6	16.6	2.2
9	SSA Marine	United States	IN	7.7	1.5	18.0	2.4
10	CMA-CGM	France	IN	7.0	1.3	14.5	1.9
11	Hanjin	Republic of Korea	DC	6.0	1.1	15.8	2.1
12	NYK Line	Japan	IN	5.2	1.0	19.0	2.5
13	HHLA	Germany	IN	5.0	1.0	9.2	1.2
14	Dragados	Spain	IN	4.9	0.9	9.1	1.2
15	APL	Singapore	DC	4.6	0.9	7.7	1.0
16	K Line	Japan	IN	4.3	0.8	8.7	1.2
17	OOCL	China, Hong Kong SAR	DC	4.2	0.8	5.5	0.7
18	Yang Ming	Taiwan Province of China	DC	4.1	0.8	7.9	1.1
19	ICTSI	Philippines	DC	3.6	0.7	7.4	1.0
20	MOL	Japan	IN	2.7	0.5	5.7	0.8
	Total			350.1	66.8	604.7	80.4
	World			524.4	100.0	751.9	100.0

Source: Compiled by the UNCTAD secretariat on the basis of data supplied by Drewry Publishing in *Global Container Terminal Operators Annual Review 2010*.

an estimated 10 per cent of world container port throughput, from 8.9 per cent in 2008 (table 6.15).

Even during the economic crisis, and in spite of financial difficulties of the parent company Dubai World, DP World did not significantly change its long-term growth strategy. It maintains a focus on new port projects and capacity expansions in Africa, Asia, Europe and South America – with a total scheduled investment value of \$2.5 billion from 2010 to 2012.⁴² The geographical portfolio of DP World, and of three other port operators, is shown in figure 6.6. All of them have a strong position in their regional home markets, and internationalize to other locations worldwide, increasing their capacity on several continents. The home ports of Dubai (United Arab Emirates), Hong Kong (China) and Singapore are all regional hub ports, providing transit and transshipment services to neighbouring countries. They cannot rely solely on the captive cargo of imports and exports. This obliges the

port operators to continuously modernize and to offer their services at competitive prices, which is a basis for their subsequent expansion into foreign container terminals.

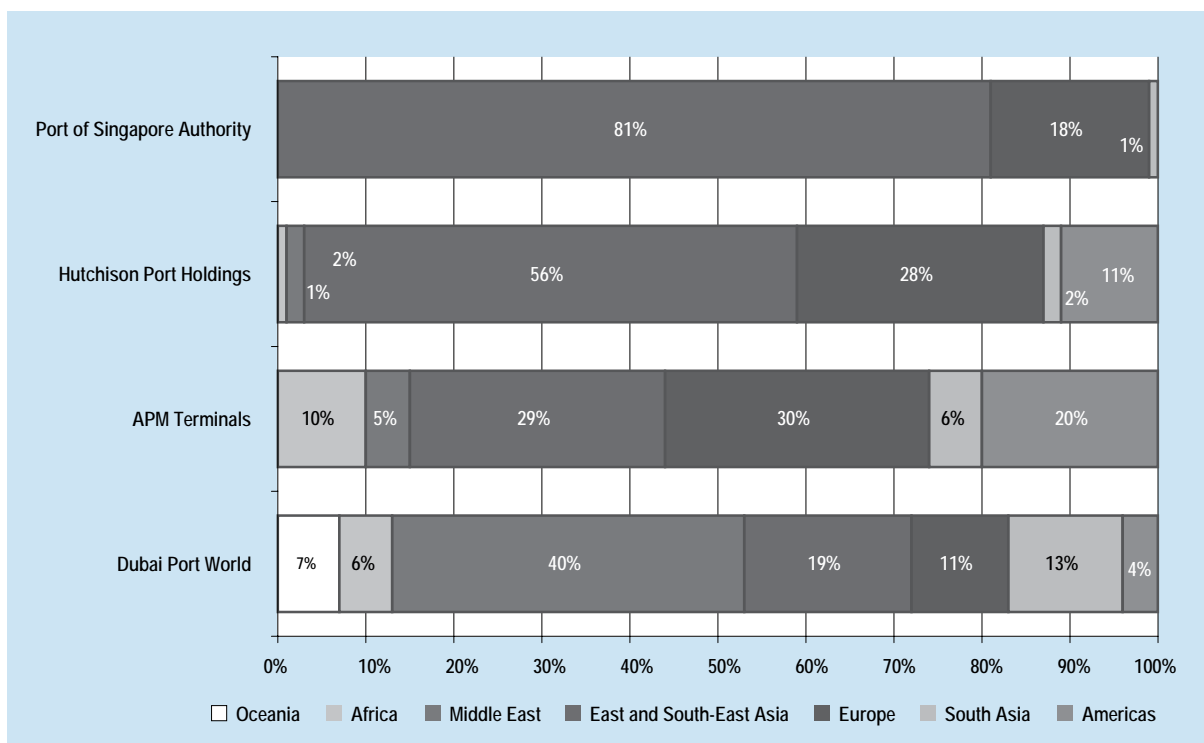
11. Other maritime-related sectors

Several other maritime-related businesses have seen growing participation by developing countries, too.

Container construction. Most containers today are built in China. China has the manufacturing capacity; it is also the country where empty containers are most needed, in view of its surplus in containerized trade.

Container leasing. About one third of containers are not owned by the shipping companies but by container lessors. Most container lessors are based in the United States and also engage in leasing of other capital goods and equipment.

Figure 6.6. Regional focus of major port operators



Source: DP World company presentations, available at <http://www.dpworld.com> and accessed in April 2011.

Table 6.15. Performance figures of Dubai Ports World

Performance Indicators Dubai Ports World	2007	2008	2009	2010
Consolidated throughput TEU million	24.0	27.8	25.6	27.8
Terminal utilization rate, percentage	81.0	80.0	74.0	80.0
Revenue, \$ million	2 613	3 283	2 821	3 078
Adjusted EBITDA, \$ million	1 063	1 340	1 072	1 240
Adjusted EBITDA margin, percentage	40.7	40.8	38.0	40.3
TEU throughput world market, percentage	8.8	8.9	9.5	10.0

Source: DP World company presentations, available at <http://www.dpworld.com> and accessed in April 2011. Also, data received directly from DP World.

Ship repair. Ships need to undergo maintenance and repair work. Several developing countries provide such services. For example, Colombia, benefiting from its geographical location near the Panama Canal, has recently made plans to expand its ship-repair capacity.

Bunkering. Ships need to bunker fuel at bunkering stations not too far from their trading routes. Thus, in principle, there is potential for providing bunkering fuel at any port of call. The largest bunkering port in the world is Singapore, followed by Rotterdam.

Brokering. The buying or chartering of ships is usually carried out through ship brokers, who act as intermediaries between the shipowners and the charterers who use the vessels to transport cargo, or between sellers and buyers of the ships themselves. The Institute of Chartered Ship Brokers, the Baltic Exchange, and Clarksons – the world's largest ship broker – are all based in London.

Ship agencies. Most shipping companies, especially in tramp shipping, do not have their own network of representative offices. When their ships call at a foreign port, they depend on ship agents to arrange for services such as bunkering, dealings with the authorities, or assistance to the crew. The largest network of independent ship agents is Multiport, which has its secretariat in London. Many ship agents are relatively small, local companies, however there are some that have global coverage, notably GAC (United Arab Emirates), Inchcape (United Kingdom) and Wilhelmsen Ship (Norway).

C. COMPARATIVE ANALYSIS OF MARITIME BUSINESSES

1. Participation of developing countries in maritime businesses

Over the past decades, developing countries have substantially expanded their fields of expertise into maritime sectors of higher business sophistication and technical complexity. First they became major market players in the provision of seafarers and in vessel registration, and now they are expanding into practically all major maritime sectors.

As illustrated in table 6.16, developing countries today have more than a 50 per cent market share in 6 of the 11 sectors covered in the table. In shipbuilding, ship scrapping, and the provision of seafarers, developing

countries account for more than three quarters of the supply. In 3 of the 11 sectors, developed countries continue to dominate, with around 90 per cent of the market – notably in P&I insurance services, ship financing and ship classification.

2. Possible barriers to participation in a maritime business

The possibility for newcomers to enter the market of a specific maritime business depends on numerous geographical, political, historical and economic factors – as illustrated by the different case studies presented in section B of this chapter. At the same time, there are also some general aspects that allow for a comparison of different maritime businesses and an appraisal of the possibilities for newcomers to enter a particular market. One such aspect is the level of market concentration; it may potentially be more difficult for a country to develop a sector if the business is already dominated by only a small number of countries. Another possible barrier to entry is the country's general level of development; setting up or strengthening a maritime sector may require certain institutional, technical and human capacities that developing countries may not necessarily have.

Market concentration: Given that countries specialize in different maritime businesses, a process of market concentration tends to occur (table 6.16). In shipbuilding, ship scrapping and insurance services, four countries together account for more than 90 per cent of the world market. Sectors that are more evenly spread over a larger number of countries are seafarer supply and containership operation, where the combined market share of the top four countries is less than 40 per cent.

Level of economic development: Table 6.16 also shows, for each maritime sector, the average GDP per capita, as an indicator of the stage of economic development.⁴³ Ship scrapping takes place in countries with the lowest average GDP per capita (\$2,094); going up the scale, the next activities are ship registration and the provision of ratings. At the other end of the spectrum, the average GDP per capita is highest in the countries hosting the P&I clubs (\$48,628), followed then by ship financing, containership operation and container terminal operation.

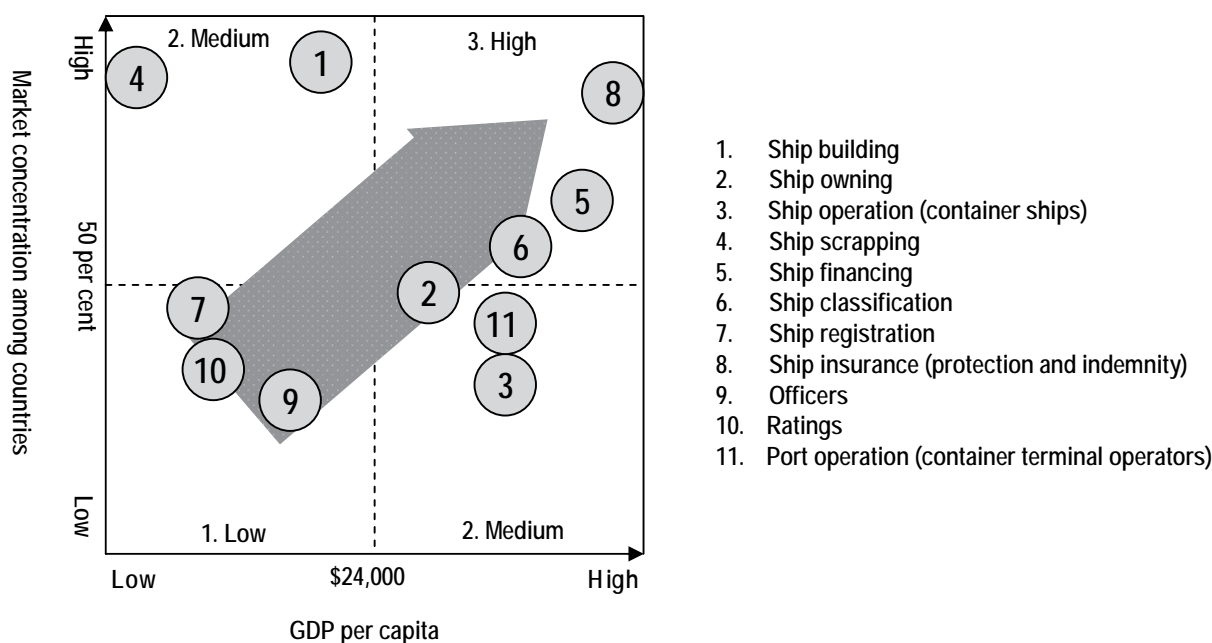
Figure 6.7 is a matrix that combines these two indicators with GDP per capita on the X-axis and

Table 6.16. Comparison of maritime sectors

Maritime sector	Share of the top 4 countries/ economies/ percentage	Share of the top 10 countries/ economies/ percentage	Market share of developing countries in the top 10, percentage	Number of developing countries/ economies in top 10	Average GDP per capita, (dollars)	Multiplicator world average per capita GDP
Ship building (dwt)	95.4	98.2	76.4	6	19 368.8	2.3
Ship scrapping (dwt)	94.3	99.0	99.0	5	2 094.0	0.2
Insurance services : P&I (dwt)	91.2	74.62	2.4	2	48 628.0	5.7
Ship financing (\$)	70.2	98.1	8.7	1	41 198.0	4.8
Ship classification (dwt)	65.0	95.4	10.6	2	36 629.3	4.3
Ship owning (dwt)	49.7	69.1	26.1	4	31 150.1	3.6
Ship registration (dwt)	45.9	72.0	53.2	6	9 219.6	1.1
Port operation : Container terminals (TEU)	43.9	61.7	67.4	5	35 639.6	4.1
Ship operation: Container ships (TEU)	36.9	73.24	41.5	5	35 847.1	4.2
Ratings (Headcount)	35.1	50.0	89.5	8	10 603.6	1.2
Officers (Headcount)	30.8	52.0	75.4	6	15 314.8	1.8

Source: See section 6.B. Estimates are based on the latest year available.

Figure 6.7. Market-entry barriers into maritime businesses, for developing countries



Source: UNCTAD secretariat, based on data from Table 6.16.

market concentration among countries on the Y-axis. The sector-specific data used to create this graph were taken from table 6.16. The matrix groups the observed sectors into four quadrants that evaluate barriers to market entry by developing countries into each maritime business. A high level of concentration combined with a high average GDP per capita (quadrant 3) implies that only a few countries (principally developed countries) participate in the business (e.g. ship financing and ship insurance). It is likely that it will be more difficult for developing countries to enter these sectors than to establish maritime industries with a low market concentration located in economies with a lower level of economic development (quadrant 1).

3. Linkages between maritime businesses

Increasingly, maritime businesses are geographically spread among different countries, with each country specializing in one or a few sectors. As a result of the increasing distance between most industries, it may seem that they are developing ever more independently from each other. While this is true for some sectors, linkages between them remain. Such linkages can be twofold.

Firstly, one sector may provide services to another, and geographical closeness can be an advantage. While this is less relevant today than it was in past decades, there may still be advantages to a shipowner in having, for example, insurance and financing services in the same country. Another example is ship classification, where the societies may find it convenient to be closer to their clients in ship building and operation and in the banks that finance the ships that require classification.

Secondly, different sectors may require the same type of inputs and framework. Low labour costs may be a cost advantage both for ship scrapping and for seafaring. An industrial base is important for manufacturing, be it of ships or port cranes. A developed services sector and a strong legal framework are preconditions for competitive banking and insurance services.

In view of these two possible linkages, it is to be expected that several maritime businesses will be found in the same country. The data on the maritime sectors covered in the analysis suggest that this is indeed the case. Table 6.17 shows the partial correlation coefficients between pairs of sectors. A positive value means that when a country's participation in one sector increases, its participation in the other will also tend to increase. The partial correlation coefficient lies between -1 (complete negative correlation) and +1 (complete positive correlation).⁴⁴

Table 6.17. Correlation analysis between maritime sectors and economic indicators

	Ship building	Ship owning	Ship operation	Ship scrapping	Ship financing	Ship classification	Ship registration	Ship insurances	Seafarer supply (officers)	Seafarer supply (ratings)	Port operation
Ship building	1.00										
Ship owning	0.52	1.00									
Ship operation	0.43	0.47	1.00								
Ship scrapping	0.33	0.20	0.15	1.00							
Ship financing	-0.04	0.25	0.30	-0.07	1.00						
Ship classification	0.37	0.57	0.32	0.05	0.40	1.00					
Ship registration	0.10	0.22	0.13	0.07	-0.07	0.10	1.00				
Ship insurance	0.08	0.20	0.03	-0.00	0.13	0.68	0.10	1.00			
Seafarer supply (officers)	0.36	0.38	0.19	0.53	-0.08	0.33	0.12	0.18	1.00		
Seafarer supply (ratings)	0.37	0.29	0.20	0.49	-0.03	0.19	0.11	0.06	0.73	1.00	
Port operation	0.22	0.30	0.50	0.15	0.37	0.12	0.23	-0.00	0.15	0.15	1.00
Legend:			≥ 0.4			≥ 0.5					

Source: UNCTAD secretariat calculations, based on data from annex VII.

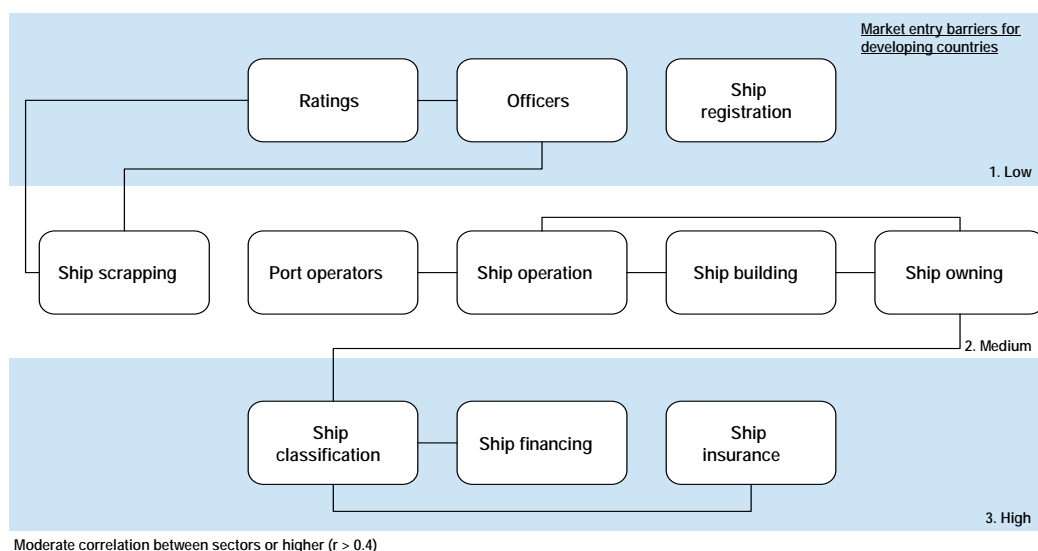
The correlation coefficient between officers and ratings is 0.73, implying that countries that provide officers are also highly likely to provide ratings. Countries such as the Philippines have built up their educational infrastructure for ratings, and now supply officers with a higher qualification profile. There is also a correlation between ship operation and shipowning (0.47). One of the reasons for this is that ship operators often own a share of their fleet and charter the missing capacity in order to react more flexibly to demand volatilities. Some other sectors, on the other hand, are rarely located in the same country; for example, the correlation coefficient between ship scrapping and insurance is zero.

More examples of countries that are active in different groups of sectors that correlate with each other can be found in annex VII, which shows the market shares of individual countries. For instance, Bangladesh and Pakistan are both leading countries in ship scrapping, and also have some participation in the provision of seafarers. Liberia and Saint Vincent and the

Grenadines have open registries, but are not active in any other maritime sector. Apart from being of different sizes in economic terms, Argentina, Brazil and China have similar maritime profiles: all three countries are active in shipbuilding, and have national shipowners and containership operators.

The linkages between different maritime sectors from the previous correlation analysis have been extracted and can be seen in figure 6.8. Correlations of moderate strength or higher ($r > 0.4$) are illustrated by a solid line. The graph groups the sectors according to the intensity of the barriers to entry into each maritime business, based on the results in figure 6.7. It indicates the probability for a developing country to establish each maritime industry. Establishing a maritime business from group 3, for instance, appears to be difficult for developing countries. Firstly, they face high market barriers when entering the sector. Secondly, few linkages to sectors with lower market-entry barriers exist that may encourage the businesses to be located in the same country.

Figure 6.8. Linkages between maritime sectors



Source: UNCTAD secretariat, based on data from tables 6.16 and 6.17.

4. The globalization of shipping

Within the globalized production of maritime transport services, developing countries are expanding into more and more sectors. They almost entirely dominate labour-intensive low-cost domains such as ship scrapping and the provision of seafarers. They also have an important and growing market share in manufacturing and in more capital-intensive maritime sectors such as ship building, owning and operation. Only the service sectors such as insurance, ship financing and ship classification have so far remained largely in the hands of developed countries, although developing countries are expanding in this area, too.

Shipping companies from both developed and developing countries alike increasingly rely on goods and services from developing countries in order to remain competitive. As far back as the 1970s, shipowners have been making use of open registries, enabling them to hire crews from countries with lower labour costs. In more recent decades, shipping companies have also started purchasing their vessels from shipyards in developing countries, as vessels constructed in European or United States shipyards may be too expensive. Today, the globalization of

maritime businesses allows shipping companies to source from the most cost-effective suppliers. This has led to a reduction of international transport costs, which benefits global merchandise trade.

The participation of developing countries in global maritime and related businesses has followed different paths and strategies, depending on the sectors and on comparative advantages and policy choices. Some developing countries have relied on the cost advantage of low wages, others have offered fiscal incentives, and yet others have chosen to support the development of national maritime sectors through industrial policies and targeted aid. For many developing countries, participation in different maritime businesses has been a trigger for economic progress.

Policymakers who aim at further strengthening their country's participation in different maritime businesses need to understand the possible linkages between them. They also need to take into account the already existing level of market concentration, as well as possible linkages between a country's level of development and its capacity to be a competitive player in a particular market. It is hoped that the data and experiences presented and discussed in this chapter may contribute to this endeavour.

ENDNOTES

- ¹ The classification of countries as "developing" in this chapter follows the official terminology of the United Nations (see also annex I).
- ² Porter M (1998). *Competitive Advantage: Creating and Sustaining Superior Performance*. New York. Free Press: 30 et seqq.
- ³ Ibid.
- ⁴ *Lloyd's List* (2011). Chinese yards churn out record bulk newbuilders. 12 January. Available at <http://www.lloydslist.com/ll/sector/dry-cargo/article353837.ece> (accessed in April 2011).
- ⁵ Germany Trade and Invest (2010). VR Chinas Schiffsbau mit positivem Jahresergebnis. Available at <http://www.gtai.de/fdb-SE,MKT201003168012,Google.html> (accessed in April 2011).
- ⁶ Ciccantell PS and Shin K-H (2009). The steel and shipbuilding industries of South Korea: Rising East Asia and globalization. Available at http://jwsr.ucr.edu/archive/vol15/Shin_Ciccantell-vol15n2.pdf (accessed in May 2011).
- ⁷ World Steel Association (2010). World crude steel output increases by 15 per cent in 2010. Available at <http://www.worldsteel.org/?action=newsdetail&id=319> (accessed in April 2011).
- ⁸ Bureau of Labour Statistics (2011). Unit labour costs in national currency, compensation, and output. Available at <http://www.bls.gov/news.release/prod4.t02.htm> (accessed in April 2011) Also: Hourly compensation costs for all employees: Transportation equipment manufacturing. Available at <ftp://ftp.bls.gov/pub/special.requests/ForeignLabor/aeind336naics.txt> (accessed in April 2011).
- ⁹ Petrobras (2011). Petrobras in numbers. Available at <http://www.petrobras.com/en/about-us/profile/> (accessed in May 2011).
- ¹⁰ UNCTAD secretariat, on the basis of fleet statistics from Containerisation International Online. Available at <http://www.ci-online.co.uk> (accessed in May 2011).

- ¹¹ Based on data from Containerisation International Online.
- ¹² The data in this paragraph are based on CSAV company presentations. Available at <http://www.csav.cl/ir/presentations-en.htm> (accessed in March 2011).
- ¹³ United States Commercial Service (2009). Chile: Maritime ports. Available at http://www.amchamchile.cl/sites/default/files/maritime_ports_io.pdf (accessed in September 2011). Also: ECLAC (2009). Port planning in Latin America and the evolution of container traffic with Asia-Pacific. FAL Bulletin. Edition no. 277, issue 9. Available at http://www.eclac.org/Transporte/noticias/bolfall/4/38994/FAL_277_port_planning.pdf.
- ¹⁴ Numbers based on presentations and websites of national shipbreaking associations.
- ¹⁵ Profit margins estimated by Xu Hui, Executive Manager, China Ship Fund. Article available at http://www.chinadaily.com.cn/bizchina/2010-04/08/content_9703387.htm (accessed in April 2011).
- ¹⁶ UNCTAD (2010). Review of Maritime Transport 2010. United Nations publication. Sales no. E.10.II.D.4. New York and Geneva.
- ¹⁷ World Bank (2010). *The Ship Breaking and Recycling Industry in Bangladesh and Pakistan*. Available at <http://siteresources.worldbank.org/SOUTHASIAEXT/Resources/223546-1296680097256/Shipbreaking.pdf> (accessed in April 2011).
- ¹⁸ Ibid.
- ¹⁹ *Lloyd's List* (2011). The return of Bangladesh. Available at <http://www.lloydslist.com/ll/sector/dry-cargo/article357812.ece> (accessed in April 2011).
- ²⁰ Marine Money (2010). Shipping China. Presentation. Available from <http://www.marinemoney.com>.
- ²¹ Clarkson Research Services (2010). Will Chinese banks make significant inroads into the international ship financing arena? Article is available from <http://www.marinemoney.com>.
- ²² Standard Chartered (2010). Presentation. Available from <http://www.marinemoney.com>.
- ²³ Ince & Co. (2011). Chinese fund for Greek shipowners. Available at <http://incelaw.com/news-and-events/News/ch-greek-fund> (accessed in May 2011).
- ²⁴ BIMCO (2009): Ship classification in the world of free competition. Available at https://www.bimco.org/en/News/2009/10/21_Feature_Week_43.aspx (accessed in April 2011).
- ²⁵ Europa Press Releases (2009). Antitrust: Commission paves way for more competition in ship classification market by making IACS's commitments legally binding. Available at <http://europa.eu/rapid/pressReleasesAction.do?reference=IP/09/1513&format=HTML&aged=0&language=EN&guiLanguage=en> (accessed in April 2011).
- ²⁶ Maritime Professional (2010). IRS membership of IACS will put an end to dual class. Available at <http://www.maritimeprofessional.com/Blogs/IRS-membership-of-IACS-will-put-an-end-to-dual-cla/June-2010/IRS-membership-of-IACS-will-put-an-end-to-dual-cla.aspx> (accessed in April 2011).
- ²⁷ *Lloyd's List* (2010). Class societies wait in line as IACS admits Indian Register. Available at <http://www.lloydslist.com/ll/sector/regulation/article171956.ece> (accessed in April 2011).
- ²⁸ CombinedMar supplied UNCTAD with its results of a recent flag cost comparison.
- ²⁹ <http://www.parismou.org/>.
- ³⁰ <http://www.igpandi.org/>.
- ³¹ Ibid.
- ³² Omni (2010). P&I Report 2010. Available at http://omniltd.ca/PDFS/OMNI_PandI_Report_2010.pdf (accessed in April 2011).
- ³³ Ibid.
- ³⁴ UN-OHRLLS (2011). Role of shipping in sustainable development. Available at http://www.un.org/special-rep/ohrls/UN_system/imo.htm (accessed in September 2011).
- ³⁵ *Philippine News* (2011). Philippines targets to capture 50 per cent of global seafarer demand by 2016. Available at <http://www.megascene.net/?p=6229> (accessed in October 2011).
- ³⁶ The Joint Manning Group is an organizational body that represents the five leading Philippine manning associations.
- ³⁷ Safety4Sea (2011). Philippines in bid to stamp out illegal seafarer recruitment. Available at <http://safewaters.wordpress.com/2010/10/20/shipping-philippines-in-bid-to-stamp-out-illegal-seafarer-recruitment/> (accessed in October 2011).
- ³⁸ ABS-CBN News (2010). RP likely to ratify ILO convention for seafarers. Available at <http://www.abs-cbnnews.com/global-filipino/10/07/10/rp-likely-ratify-ilo-convention-seafarers> (accessed in May 2011).
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- ⁴⁰ DP World (2010). Company presentations. Available at <http://www.dpworld.com> (accessed in April 2011). Also: data received directly from port operator.
- ⁴¹ Drewry Publishing (2010). *Global Container Terminal Operators: Annual Review and Forecast 2010*. London.
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⁴² DP World (2010). Company presentations. Available at <http://www.dpworld.com> (accessed in April 2011). Also: data received directly from port operator.

⁴³ The average GDP per capita for each sector has been calculated by (a) multiplying each country's market share in the business with its average GDP per capita; and (b) adding the results for all countries participating in the business.

⁴⁴ The correlations are calculated by Excel, using the Pearson correlation. This calculates the correlation coefficient between two measurement variables (here, maritime sector data) when measurements on each variable are observed for each of N subjects (countries). Any missing observation for any subject causes that subject to be ignored in the analysis. The formula applied is shown below:

$$r = \frac{\sum XY - \frac{\sum X \sum Y}{N}}{\sqrt{(\sum X^2 - \frac{(\sum X)^2}{N})(\sum Y^2 - \frac{(\sum Y)^2}{N})}}$$

The following list includes the data behind each variable of the correlation analysis:

1. Ship building. Ships built in country, in GT (2009).
2. Ship owning. Owned ships of companies with nationality of country, in dwt (2010).
3. Ship operation. Containership operators from country, in TEU (2010).
4. Ship scrapping. Ships scrapped in country, in GT (2010).
5. Ship finance. Ship-financing portfolio of banks in country, in dollars; the data only comprise the 25 largest ship-financing banks (2010).
6. Ship classification. Ships classified by classification society from the country, in GT (2010).
7. Ship registration. Ships registered by registries from country, in dwt (2010).
8. Ship insurance. Ships insured by P&I club from country, in GT (2010).
9. Seafarer supply (officers). Number of officers supplied by country (2010).
10. Seafarer supply (ratings). Number of ratings supplied by country (2010).
11. Port operation. Container terminal port operators headquartered in country, port traffic in TEU (2009).

