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Chapter 5



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PORT AND MULTIMODAL TRANSPORT DEVELOPMENTS

CHAPTER 5

World container port throughput declined by an estimated 9.7 per cent to 465.7 million TEUs in 2009. Chinese mainland ports accounted for approximately 23.3 per cent of the total world container port throughput. UNCTAD's Liner Shipping Connectivity Index revealed that between 2004 and 2009, the ranking of the Least Developed Countries (LDCs) improved by 3 points. The LDCs' average ranking in 2009 was 109, compared to 76 for other developing countries and 68 for developed countries. In 2009, there were 15 LDCs that had only one to four service providers. This was almost a doubling compared to 2004, when there were only 8 LDCs with only one to four service providers.

The global trucking sector registered a compound annual growth rate in revenue of 7.8 per cent between 2004 and 2008. In the rail sector, freight and passenger services achieved a compound annual growth rate in revenue of 6.3 per cent during the period 2003–2007. Inland water transportation continues to remain underutilized in many economies.

This chapter covers some of the major port development projects under way in developing countries, container throughput, liner shipping connectivity, improvements in port performance, and multimodal transportation in the areas of road, rail, and inland waterways.

A. PORT DEVELOPMENTS

Container port throughput

Since 1990, there has been a more than fivefold increase in containerized cargo. As a consequence, the world's fleet of container ships has grown, by around seven times. More recently, over the course of 2009, the carrying capacity of the world's container fleet increased by 7 million dwt or 5.6 per cent (chapter 2). However, because of the global economic crisis and corresponding decline in trade, the situation now facing some ports is a glut of container ships lying idle. The deepening of the global financial crisis towards the end of 2008 has also had an effect on port throughput volumes and on port revenue.

Despite the global downturn in liner traffic, world container port throughput in 2008 showed an increase of approximately 4.5 per cent, to reach 508.4 million TEU moves. This was largely attributable to gains made earlier in the year when world trade was booming. The declines in throughput experienced in the fourth quarter did much to dilute the earlier gains, as contagion spread and concerns about the global economy increased. Preliminary figures for world container port throughput for 2009 (measured in twenty-foot equivalent units (TEUs)) show a decrease of around 10 per cent, down to 465.7 million TEUs, as the global financial crisis dampened demand for goods.¹

Table 5.1 shows the latest figures available on world container port traffic for 65 developing economies with an annual national throughput of over 100,000 TEUs. In 2008, the container throughput growth rate for developing economies was 8.2 per cent, with a throughput of 347.2 million TEUs; this accounted for approximately 68 per cent of total world throughput, up from around 66 per cent the previous year.

In 2008, out of all the 65 developing economies listed, 29 experienced double-digit growth in port throughput compared to the preceding year. The 10 countries registering the highest growth were the Libyan Arab Jamahiriya (43.2 per cent), Jordan (40.7 per cent), Madagascar (27.5 per cent), Panama (27.5 per cent), Cameroon (24 per cent), the Dominican Republic (23.6 per cent), Peru (22.4 per cent), Côte d'Ivoire (20.9 per cent) and Oman (19.2 per cent). The Dominican Republic has been on the list of ports with double-digit growth for the last three years. The country with the largest share of container throughput continues to be China.

Chinese ports (excluding Hong Kong SAR) grew on average by 11.6 per cent in 2008 over the previous year to reach 115 million TEUs. Preliminary figures for 2009 showed a decline for Chinese port throughput of around 6.1 per cent, to 108 million TEUs. Terminals in the Bohai Bay area declined by 11.8 per cent, against 8.5 per cent along the Yangtze Delta, and 7.6 per cent in the Pearl River Delta and on the South-East Coast.² Ports in the Bohai Bay area (North-East China), where large numbers of factories are located, fared slightly worse than those in the south of the country, where the opposite could be expected due to the strong presence of transit ports in the region. Most of this decline was attributable to the terminal in the port of Dalian, where throughput declined by almost 9 per cent. Elsewhere in China, substantial declines were seen at several terminals in Shanghai, which, together, declined by about 18 per cent. The port of Yangzhou, located on the Yangtze upstream from Shanghai, suffered the largest decline in port throughput, at around 27 per cent. Container throughput at the port of Yangzhou declined by 17.5 per cent. COSCO Pacific's newly opened terminal in the port of Jinjiang was successful in attracting new business, with throughput growing by a staggering 41.6 per cent to 274,390 TEUs in 2009.

Table 5.2 shows the world's 20 leading container ports for 2009. This list includes 15 ports from developing economies, all of which are in Asia (see chapter 7); the remaining 5 ports are from developed countries (of which three are located in Europe and two are located in the United States). Of the 15 ports located in developing economies, 8 are in China (including Hong Kong SAR). The other ports are located in the Republic of Korea, Malaysia (two ports), Singapore, Taiwan Province of China, Thailand, and the United Arab Emirates. Container throughput in these ports reached 220.9 million TEUs in 2009 – a fall of 10.5 per cent compared to 2008. The majority of the ports listed remained in the same position for the third consecutive year, although the ports further down the league were subject to considerable shifting of fortunes and jostling for position. The top five ports all retained their respective positions in 2009, with Singapore retaining its lead as the world's busiest container port, followed by Shanghai, Hong Kong, Shenzhen and Busan (table 5.2). The gap between Singapore and Shanghai shortened considerably in 2009 to 864,400 TEUs, from 1.9 million TEUs in the previous year.

Table 5.1. Container port traffic for 65 developing economies: 2007, 2008 and 2009 (in TEUs)

Name of country or territory	2007	2008	Preliminary figures for 2009	Percentage change 2008–2007	Percentage change 2009–2008
China	103 823 024	115 934 578	108 860 631	11.67	-6.10
Singapore ^a	28 767 500	30 891 200	26 592 800	7.38	-13.91
China, Hong Kong	23 998 449	24 494 229	20 983 000	2.07	-14.33
Republic of Korea	17 086 133	17 417 723	15 749 676	1.94	-9.58
Malaysia	14 828 836	15 813 769	15 458 980	6.64	-2.24
United Arab Emirates	13 182 412	14 756 127	14 437 588	11.94	-2.16
China, Taiwan Province of	13 720 013	12 971 224	11 352 097	-5.46	-12.48
India	7 376 733	7 660 705	7 849 982	3.85	2.47
Indonesia	6 582 910	7 062 872	6 568 791	7.29	-7.00
Brazil	6 464 724	6 904 260	6 271 332	6.80	-9.17
Egypt	5 194 676	6 114 629	6 172 637	17.71	0.95
Thailand	6 339 261	6 726 237	5 981 737	6.10	-11.07
Panama	4 022 513	5 129 499	4 597 112	27.52	-10.38
Viet Nam	4 009 066	4 393 699	4 533 606	9.59	3.18
Turkey	4 678 872	5 193 730	4 491 206	11.00	-13.53
Saudi Arabia	4 208 854	4 652 022	4 430 676	10.53	-4.76
Philippines	4 338 993	4 465 582	4 170 389	2.92	-6.61
Oman	2 876 969	3 427 990	3 813 991	19.15	11.26
South Africa	3 712 090	3 900 319	3 510 240	5.07	-10.00
Sri Lanka	3 687 338	3 687 465	3 464 297	0.00	-6.05
Mexico	1 661 208	3 310 192	2 869 571	99.26	-13.31
Chile	2 725 218	3 150 020	2 776 562	15.59	-11.86
Russian Federation	2 962 385	3 371 559	2 478 136	13.81	-26.50
Iran (Islamic Republic of)	1 722 513	2 000 230	2 206 476	16.12	10.31
Colombia	2 076 760	1 955 685	2 017 924	-5.83	3.18
Pakistan	1 935 882	1 938 001	1 877 052	0.11	-3.14
Jamaica	2 016 792	1 915 943	1 689 670	-5.00	-11.81
Argentina	1 874 259	1 997 146	1 611 678	6.56	-19.30
Bahamas	1 632 000	1 702 000	1 323 000	4.29	-22.27
Peru	1 233 547	1 509 507	1 301 426	22.37	-13.78
Venezuela (Bolivarian Republic of)	1 331 711	1 325 194	1 239 508	-0.49	-6.47
Bangladesh	978 007	1 091 719	1 179 548	11.63	8.05
Ecuador	674 837	670 831	1 000 895	-0.59	49.20
Lebanon	947 625	945 105	992 559	-0.27	5.02
Guatemala	870 288	937 642	906 326	7.74	-3.34
Costa Rica	976 621	1 004 971	875 687	2.90	-12.86
Dominican Republic	883 785	1 092 430	716 078	23.61	-34.45
Côte d'Ivoire	590 306	713 625	677 029	20.89	-5.13

Table 5.1. Container port traffic for 65 developing economies: 2007, 2008 and 2009 (in TEUs) (concluded)

Name of country or territory	2007	2008	Preliminary figures for 2009	Percentage change 2008–2007	Percentage change 2009–2008
Jordan	414 000	582 515	674 525	40.70	15.80
Yemen	773 016	772 792	634 876	-0.03	-17.85
Kenya	585 367	615 733	618 816	5.19	0.50
Uruguay	596 487	675 273	588 410	13.21	-12.86
Syrian Arab Republic	538 525	610 607	575 299	13.39	-5.78
Honduras	636 435	669 802	571 756	5.24	-14.64
Trinidad and Tobago	514 557	554 093	567 183	7.68	2.36
Ghana	544 294	612 362	551 126	12.51	-10.00
Ukraine	990 201	1 123 268	522 364	13.44	-53.50
Sudan	342 152	391 139	431 232	14.32	10.25
Mauritius	412 896	454 433	420 055	10.06	-7.57
United Republic of Tanzania	350 991	363 310	343 851	3.51	-5.36
Senegal	424 457	347 483	331 076	-18.13	-4.72
Cuba	319 857	319 000	287 100	-0.27	-10.00
Papua New Guinea	282 356	254 592	262 209	-9.83	2.99
Algeria	200 050	225 140	249 073	12.54	10.63
Tunisia	420 501	424 780	243 995	1.02	-42.56
Cameroon	217 681	270 000	243 000	24.03	-10.00
Bahrain	238 624	269 331	242 398	12.87	-10.00
Cambodia	253 271	258 775	232 898	2.17	-10.00
Georgia	184 792	209 614	188 653	13.43	-10.00
Namibia	148 234	183 605	165 245	23.86	-10.00
Libyan Arab Jamahiriya	122 122	174 827	157 344	43.16	-10.00
Croatia	145 040	168 761	151 885	16.35	-10.00
Guam	165 427	167 784	151 006	1.42	-10.00
Madagascar	112 427	143 371	132 278	27.52	-7.74
El Salvador	144 458	156 323	126 369	8.21	-19.16
Subtotal	317 479 388	343 228 373	316 693 913	8.11	7.73
Other reported^b	621 116	715 048	594 822	15.12	-17.11
Total reported^c	316 692 444	345 345 013	317 288 735	9.05	-7.81
World total^d	488 916 538	515 762 923	465 697 537	5.49	-9.73

Source: UNCTAD secretariat, derived from information contained in Containerization International Online (June 2010), from various Dynamar B.V. publications, and from information obtained by the UNCTAD secretariat directly from terminal and port authorities.

^a Singapore, in this table, includes the port of Jurong.

^b Comprises developing economies where fewer than 100,000 TEUs per year were reported or where a substantial lack of data was noted.

^c Certain ports did not respond to the background survey. While they were not among the largest ports, the total omissions can be estimated at 5 to 10 per cent.

^d While every effort is made to obtain up-to-date data, the figures for 2009 are, in some cases, estimates. Port throughput figures tend not to be disclosed by ports until a considerable time after the end of the calendar year. In some cases, this is due to the publication of annual accounts at the close of the financial year. Country totals may conceal the fact that minor ports may not be included; therefore, in some cases, the actual figures may be higher than those given. The figures for 2008 are generally regarded as more reliable, and are therefore more often quoted in the accompanying text.

**Table 5.2. Top 20 container terminals and their throughput for 2007, 2008 and 2009
(in TEUs and percentage change)**

Port name	2007	2008	2009	Percentage change 2007–2008	Percentage change 2008–2009
Singapore ^a	27 935 500	29 918 200	25 866 400	7.10	-13.54
Shanghai	26 150 000	27 980 000	25 002 000	7.00	-10.64
Hong Kong	23 998 449	24 248 000	20 983 000	1.04	-13.47
Shenzhen	21 099 169	21 413 888	18 250 100	1.49	-14.77
Busan	13 261 000	13 425 000	11 954 861	1.24	-10.95
Guangzhou	9 200 000	11 001 300	11 190 000	19.58	1.72
Dubai	10 653 026	11 827 299	11 124 082	11.02	-5.95
Ningbo	9 360 000	11 226 000	10 502 800	19.94	-6.44
Qingdao	9 462 000	10 320 000	10 260 000	9.07	-0.58
Rotterdam	10 790 604	10 800 000	9 743 290	0.09	-9.78
Tianjin	7 103 000	8 500 000	8 700 000	19.67	2.35
Kaohsiung	10 256 829	9 676 554	8 581 273	-5.66	-11.32
Port Klang	7 118 714	7 970 000	7 309 779	11.96	-8.28
Antwerp	8 175 952	8 663 736	7 309 639	5.97	-15.63
Hamburg	9 900 000	9 700 000	7 010 000	-2.02	-27.73
Los Angeles	8 355 039	7 849 985	6 748 994	-6.04	-14.03
Tanjung Pelepas	5 500 000	5 600 000	6 000 000	1.82	7.14
Long Beach	7 312 465	6 487 816	5 067 597	-11.28	-21.89
Xiamen	4 627 000	5 034 600	4 680 355	8.81	-7.04
Laem Chabang	4 641 914	5 133 930	4 621 635	10.60	-9.98
Total Top 20	234 900 661	246 776 308	220 905 805	5.06	-10.48

Source: UNCTAD secretariat and *Containerisation International Online* (May 2010).

^a Singapore, in this table, does not include the port of Jurong.

Container port networks

Traditional ports are known as “gateway” ports, because they act as a gate through which imports and exports must pass in order to be traded internationally. However, increasingly, ports also function as transshipment ports (most especially, in the liner trade, by taking containers off one ship and placing them on another ship bound for a different destination). To measure containerized trade, UNCTAD has developed the Liner Shipping Connectivity Index (LSCI), which is described below in greater detail.

Liner shipping connectivity

Most international trade in manufactured goods is transported by containerized liner shipping services. These liner services form a global maritime transport network, through which practically all coastal countries are connected to one another. The level of “connectivity” of countries to this global network

varies, and UNCTAD’s annual LSCI aims at capturing trends and differences in countries’ liner shipping connectivity. The LSCI has been produced since 2004. It covers 162 coastal countries, and consists of five components, namely (a) the number of ships; (b) their container-carrying capacity; (c) the number of companies; (d) the number of services provided; and (e) the size of the largest vessels that provide services from and to each country’s seaports.³

Most LDCs are also among the least connected countries. The average ranking of LDCs in 2010 was 111, compared to an average ranking of 78 for other developing countries and 64 for developed countries (table 5.3).⁴ Container shipping companies are less likely to provide services to and from the seaports of LDCs, because (a) national trade volumes tend to be lower; and (b) a lower level of development will often make ports less attractive for transshipment and transit cargo.

Table 5.3. Average LSCI rankings of country groups, 2010

	Developed economies	Economies in transition	Developing economies	LDCs	Total
Africa			72	105	90
Asia	22	134	51	121	61
Europe	64	89			68
Latin America and the Caribbean	79		92	101	92
North America	87				87
Oceania	50		114	134	109
Total	64	97	78	111	82

Source: UNCTAD calculations, based on data provided by *Containerisation International Online*.

Starting from a low base, and catching up with port infrastructure investment and the introduction of private sector operations, seaports in several LDCs managed to become more attractive as ports of call for international liner shipping companies during the six years from 2004 to 2010. Among the LDCs that moved up significantly in the global LSCI ranking during this period are Djibouti (+43 points), the Democratic Republic of the Congo (+23 points), the Solomon Islands (+19 points), Bangladesh (+14 points), and Sao Tome and Principe (+11 points). Djibouti is the best-connected LDC, benefiting both from its geographical position near major liner shipping routes and from private sector investments. Other LDCs saw their ranking worsen during the 2004–2010 period, including Yemen (-37 points), Maldives (-32 points), Eritrea (-23 points), Comoros (-12 points), Vanuatu (-10 points) and Madagascar (-7 points).

Looking at some of the components of the LSCI, additional trends for LDCs can be seen (tables 5.4 and 5.5). On average, the largest container ships that call at LDC seaports are 60 per cent smaller than those providing services to other developing countries. This is as much a reflection of lower traded volumes as it is a consequence of less developed seaport infrastructure. Larger container ships require more dredging, as well as specialized cranes which are less likely to be found in the ports of LDCs. Between 2004 and 2010, the average maximum size container ship servicing all countries increased by 66 per cent – from 2,763 TEUs to 4,590 TEUs. During the same period, the maximum size container ship servicing LDCs increased on average by only 33 per cent, to 1,959 TEUs.

While vessel sizes have increased, the number of liner shipping companies has continued to decline. Both developments are part of the same long-term

trend towards industry concentration and seeking economies of scale. The average number of container shipping companies providing services to and from the ports of LDCs is only one third of the global average. This means that importers and exporters from LDCs have fewer choices when contracting containerized maritime transport. Empirically, a lower level of competition is closely correlated with higher freight rates – that is to say, LDCs will be confronted with higher transaction costs for their foreign trade.⁵ The global trend of mergers and acquisitions has not only affected the supply of services to LDCs (table 5.5). In fact, the decline in the number of companies servicing developed countries has been even more marked than for LDCs. However, on average, there are still 28 container carriers that deploy vessels on routes from and to developed countries, which is usually more than sufficient to ensure an adequate level of competition to avoid monopolistic pricing practices. For many LDCs, however, the further reduction of supply from already low levels may raise concerns with national competition authorities. By 2010, there were six LDCs with only one or two service providers, compared to the year 2004 when there were only three LDCs with such low levels of competition.

A similar trend is found when analysing the number of countries with direct liner service connections. The data available for 2006 and 2009 show that the global average of direct connections per country remained stable during this three-year period, while the number of direct connections per LDC declined by 20 per cent. As shipping services connect with each other in larger ports that have more captive cargo and employ bigger vessels, countries with lower volumes and less efficient ports are more likely to be served by so-called feeder services that link their container transport services to global networks through hub ports.

**Table 5.4. Average of maximum vessel sizes, by country grouping, in 2010
(in TEUs; the change between 2004 and 2010 is shown in italics)**

	Developed economies	Economies in transition	Developing economies	LDCs	Total
Africa			4 494	2 125	3 185
			<i>2 187</i>	<i>592</i>	<i>1 285</i>
Asia	9 650	1 022	7 578	1 669	6 690
	<i>3 270</i>	<i>46</i>	<i>3 335</i>	<i>-268</i>	<i>2 673</i>
Europe	6 962	3 447			6 413
	<i>3 589</i>	<i>1 458</i>			<i>3 219</i>
Latin America and the Caribbean	2 556		3 417	2 127	3 359
	<i>-710</i>		<i>1 067</i>	<i>1 176</i>	<i>1 023</i>
North America	5 289				5 289
	<i>1 889</i>				<i>1 889</i>
Oceania	4 606		1 810	1 224	2 065
	<i>494</i>		<i>-5</i>	<i>327</i>	<i>250</i>
Total	6 672	3 043	4 736	1 959	4 590
	<i>3 022</i>	<i>1 256</i>	<i>1 847</i>	<i>482</i>	<i>1 827</i>

Source: UNCTAD calculations, based on data provided by *Containerisation International Online*.

**Table 5.5. Average number of companies providing services per country, in 2010
(change between 2004 and 2010 is shown in italics)**

	Developed economies	Economies in transition	Developing economies	LDCs	Total
Africa			16	7	11
			<i>-1</i>	<i>1</i>	<i>-1</i>
Asia	39	6	31	5	27
	<i>1</i>	<i>2</i>	<i>-9</i>	<i>-2</i>	<i>-8</i>
Europe	27	9			24
	<i>-8</i>	<i>-3</i>			<i>-8</i>
Latin America and the Caribbean	14		12	7	12
	<i>-5</i>		<i>-2</i>	<i>-4</i>	<i>-2</i>
North America	29				29
	<i>3</i>				<i>3</i>
Oceania	32		6	4	9
	<i>-7</i>		<i>-2</i>	<i>-1</i>	<i>-2</i>
Total	28	9	18	6	18
	<i>-6</i>	<i>-2</i>	<i>-5</i>	<i>0</i>	<i>-4</i>

Source: UNCTAD calculations, based on data provided by *Containerisation International On-line*.

Improvements in port performance

Cargo handling within ports is an area where increased efficiency could assist the international flow of goods. As ships have grown bigger in recent decades, cargo handling methods have tended only to increase by incremental amounts. The following section gives a snapshot of improvements in port performance from around the world.

In the Caribbean, Jamaica's port of Kingston achieved a productivity record of 36 moves per hour during the loading/unloading of the 10,062 TEU capacity *M/V Zim Antwerp*.⁶ In all, some 9,200 moves were made in April 2010, enabling the vessel to turn around within five days of arriving in port.

In Africa, the Apapa Container Terminal in Nigeria, which is operated by APM Terminals, performed 2,249 moves in 47.3 hours loading and unloading the 2,890 TEU *M/V Maersk Pembroke*. A new terminal record of 47.26 moves per hour was set in June 2009. Previously, it would have taken six days to complete the loading and unloading of a vessel of this size.⁷ The record was made possible by the addition of new cargo handling equipment, including 34 new trucks, four rubber-tyred gantries (RTG) and four Post Panamax cranes.

In the Middle East, Khalifa Bin Salman Port, Bahrain, set a new berth productivity record of 62.1 moves per hour in 2009, which was an 82.1 per cent increase over the average berth productivity recorded during its first year of operation.⁸ In the United Arab Emirates, Khorfakkan Container Terminal performed 8,816 moves on the *CMA CGM Aquila* during the vessel's recent call at the terminal – a record number of moves during a single vessel call. The moves were achieved at a productivity rate of 295 container moves per hour, and the *CMA CGM Aquila*, which arrived at Khorfakkan Container Terminal on a Thursday evening, and was able to depart on the Saturday morning.⁹

In India, Cochin Port achieved a productivity record during October 2009 by unloading 10,024 tons of industrial salt in bulk from the *M/V Luxury SW*. This is the highest quantity of industrial salt to be handled in one day by the port. Another productivity record was achieved soon after, when urea was unloaded from the *M/V World Trader* at an average daily output of over 5,000 tons.¹⁰

In Bangladesh, Chittagong Port Authority has increased from two to three shifts per day, allowing for round-the-clock operation – 24 hours a day and 363 days a year (with the two Eid holidays off). The

outcome is that vessel turnaround time has been reduced from 11 days to 3.6 days, and container dwell time has reduced from 26 days to 18.3 days.¹¹

At Malaysia's Port Klang, a new crane productivity record of 734 moves in a single hour of operations (or 940 TEUs), which is a world record, using nine cranes, was achieved in March 2010 while loading and unloading the *M/V CSCL Pusan*, a 9,600 TEU vessel. A total of 5,244 moves were made on this vessel.¹²

Recent port developments

This section provides a brief overview of some of the port developments occurring around the world, while chapter 7 contains a section on developments specifically in Asia. Both sections are intended to be informative rather than exhaustive, and pertain to developing economies and to countries with economies in transition. Many port development projects under way in 2009 experienced a slowdown in activity, due to uncertainty about the effects of the global economic crisis and a fear of creating ports without customers, or so-called "white elephants". One of the difficulties in analysing port developments is that any slowing down of construction work or hiatus in building plans is rarely as well publicized as new projects which are expected to create new jobs and boost trading opportunities.

Latin America is currently undertaking some of the world's most sizable port development projects, with much of the finance coming from other developing countries both inside and outside the region. Brazil has continued with its plans to double the capacity of the port of Santos through the Barnabé Bagres project, which will see container capacity increase to between 8 and 10 million TEUs by 2015. Elsewhere in Brazil, a 63.5 million BRL (\$35.5 million) tender for dredging at Fortaleza port was launched. The Brazilian Government hopes to attract some \$20 billion of private sector investment over the next five years for various port projects. Rio de Janeiro should receive 300 million BRL (\$172 million) of the total 700 million BRL to be invested in seven cities. Meanwhile, the Special Secretariat of Ports has signed a contract with a consortium formed by the JDN (Jan de Nul) and Dratec, for carrying out dredging works to deepen the ports of Aratu and Salvador (in Bahia) to 15 meters. The Brazilian port authority, Codesa, has announced the development of Superporto, a \$300 million deepwater port project outside the port of Tubarão. Apparently the deepwater project has attracted the interest of a number of leading players, including Japan's NYK

Line. Also in Brazil, plans for the Porto Brasil project in Peruíbe, 50 kilometres south of Santos, were shelved in 2008 and then revived in 2009 as the effects of the global economy were analysed. The port is expected to have a container capacity of 3.2 million TEUs, plus bulk and liquid facilities. In the first half of 2009, container throughput in Brazilian ports was down by around 19 per cent, with Santos suffering a 24 per cent decline.

In Costa Rica in 2009, a tender was launched for the development of a new terminal as part of the port complex development in Limón-Moín. The new terminal is located 10 kilometres away from the existing Moín and Limón port terminals. The new port will have the capacity to handle Panamax vessels of up to 65,000 dwt, and is expected to be operating by 2016. Firms from Brazil, Colombia, France and the United States are reportedly studying the bidding rules for the \$812 million port concession.

The expansion of the Panama Canal has prompted Cuba to fund the expansion and modernization of its three main ports in collaboration with China and the Bolivarian Republic of Venezuela. Dredging will deepen draught in Havana, Cienfuegos and Santiago, which handle 80 per cent of Cuba's international trade. No major dredging work has been undertaken at these ports for at least 30 years, and the available draught has declined as a consequence. This is one of the main reasons why cargo volumes have shrunk from 12 million tons in 1982 to around 3 million tons. Havana handles no more than 700,000 tons annually, despite having a capacity of 1.2 million tons. It will have its quayside infrastructure upgraded, and four of its seven cranes modernized. Most of the port modernization will be financed by China. Plans are also afoot to develop the port of Mariel, to the west of the capital, using \$300 million of Brazilian finance.

In Peru, investments in the main port of Callao are expected to reach \$3 billion over the next four years, as demand rises for shipments of metals, natural gas and coffee. Companies including the Dubai-based DP World Ltd., Brazil's Vale SA, and a unit of Mota-Engil SGPS SA (which is based in Porto, Portugal) are investing \$1.45 billion to expand facilities in Callao, with an additional \$1.55 billion planned. The port expansions are part of the Government's drive to secure up to \$60 billion in infrastructure investments to modernize its aging ports and cut shipping costs. Peru's exports, which totalled \$31 billion in 2008, have jumped fourfold since 2001. Other Peruvian

port projects being developed include DP World's \$460 million upgrade of Callao port, a \$600 million expansion of the Muelle Norte pier at Callao, and a \$900 million project to expand the ports of Marcona in the south and Bayóvar in the north.

In Uruguay, a \$20 million loan to help advance the country's plan to upgrade the port in Montevideo has been approved by the Inter-American Development Bank. The project will expand the port and boost its efficiency, contributing to a reduction in maritime and river transportation costs by building a multi-purpose wharf and deepening the access channel in order to allow access by larger vessels.

In Africa, port development projects are progressing through financing from other developing countries – an example of South–South cooperation. For instance, in Sudan, a new container terminal will be built at the port of Digna by the China Harbour Engineering Company. Development of Sudan's infrastructure has accelerated in recent years, with China as one of the main providers of equipment and labour. The terminal will reportedly be built with two container berths able to accommodate ships of up to 100,000 tons in size. The total cost of the project is expected to be more than \$100 million, and it is expected to take about three years to complete.

In Kenya, plans have been announced to build a second port to Mombasa at the coastal town of Lamu. The port, together with a rail and road corridor, will link the coast with Isiolo. The project will be financed by investment from China. Meanwhile, plans for the construction of a second 1.2 million TEU container terminal at Mombasa are under way. The first phase will be financed by a Japan International Cooperation Agency loan and should be operational in 2013.

In Madagascar, Ehoala Port, near Fort Dauphin on the southern tip of the island, opened in 2009. Ehoala Port has been financed and developed jointly by the Rio Tinto mining group (\$240 million) and the Malagasy State (\$35 million), through a World Bank-funded project aimed at developing the Anosy region of southern Madagascar. Ehoala Port is a deepwater port with a maximum draught of 15.75 metres and is protected by a 625-metre-long breakwater. The single quay has three berths – a 275-metre-long primary berth dredged to 15.75 metres, a 150-metre-long secondary berth dredged to 8 metres, and a 75-metre-long third berth. The port has a secure yard for storing containers and breakbulk cargo, including power points for reefer containers, a large limonite

ore storage shed, two warehouses for general cargo storage, and an adjacent 400-hectare industrial zone with ample supplies of water and electricity. The port management company is a wholly owned subsidiary of Rio Tinto.

In Senegal, a €47.5 million loan to upgrade the container terminal at the port of Dakar has been signed between the African Development Bank (AfDB) Group and DP World Dakar. The port of Dakar is one the busiest in West Africa, handling 90 per cent of the total value of Senegal's foreign trade. Its geographical location is at the crossroads between Europe, North America, South America and sub-Saharan Africa. The project comprises (a) equipment upgrades; (b) operation, management, and maintenance of the existing container terminal in the northern zone of the port; and (c) improving other infrastructure such as rail installations, electricity, roads, and port buildings.

In Cameroon, work has begun on construction of the Kribi Deep Sea Port project, south of the capital Douala. The port – which has no completion date – will cater mainly for the container, timber, hydrocarbon and cereals industries.

In Namibia, Namport, which operates the ports of Walvis Bay and Luderitz, will take delivery in 2010 of six rubber-tyred gantry cranes. These new RTGs will make more effective use of space thanks to an increased stacking density, and will increase the port's terminal capacity by 42 per cent. The RTGs will be fitted with twin lift spreaders, which provide a capacity of 50 tons, to further increase handling efficiency. Furthermore, the RTGs will be among the first in Africa to be equipped with an automatic steering and container verification system. Moreover, with a variable speed generator, the engine will run at lower revolutions per minute when idling and the engine speed will be automatically adjusted according to the power required, resulting in lower fuel consumption.

In 2010, work began on the dredging of South Africa's port at Durban. The end result will be a deepening of the port from 12.8 metres to 19 metres in the outer channel and 17 metres in the inner port, and a widening of the entrance channel from 120 meters to 220 meters. As a result, container vessels of up to 9,400 TEUs and other vessels of a similar size will be able to call at the port of Durban. In 2009, not far from Durban, the port of Ngqura opened for business (see the *Review of Maritime Transport 2009*). Ngqura is South Africa's third-deepest port, and was built

to help relieve congestion at Durban. However, the opening of the port, in the fourth quarter of 2009, came just as global container volumes were declining and nations were shifting their focus away from transport congestion. The second phase of development was expected to increase throughput from 800,000 to 2 million TEUs.

In Europe, the number of new port projects has decreased. In Albania, plans to develop a new deepwater container terminal at the port of Vlore have progressed, with the signing of a 35-year concession agreement with Swiss-based Zumax AG. The project is planned to include a 3 million TEU capacity container terminal adjacent to a free trade zone, and could be operational by 2011.

In Ukraine, a number of court rulings between Uktranscontainer and the state-run Sea Commercial Port of Illichivsk have left uncertainty as to the future management of the container terminal. In May 2007, the port of Illichivsk was among the first container terminals in CIS countries and the Baltic to accommodate a container ship with a capacity of over 5,000 TEUs, and Maersk Line included the port as part of a regular service between Ukraine and China.

The number of port development projects has also been reduced in Asia, compared to recent years (see chapter 7 for details of port developments since 2007). In India, legal issues have forced a delay to new terminal facilities at Jawaharlal Nehru and Tuticorn. Both projects were intended to extend capacity by 600,000 TEUs, however, due to concerns over competition, both projects are expected to be delayed by a period of up to a year.

In the Republic of Korea, Busan New Port implemented the world's first "horizontal terminal" at the Hanjin New Port Company. It is anticipated that this will be able to achieve an 80 per cent reduction in yard operating costs and a 30 per cent increase in terminal productivity. Also in Busan, the port authority has announced an incentive payment plan for regular customers that could allow them to defer payment of entry, dockage and anchorage fees for a year. This effort is seen as a novel approach to help the beleaguered shipping lines to combat the economic downturn.

In Turkey, Yilport Container Terminal and Port Operators Inc. is implementing container automation solutions at its facility in Gebze. Being the first container terminal in the world to have integrated Automated Gate System (AGS), Crane Optical Character Recognition (OCR) and

MatchMaker RTG within the Zebra SPARCS solution, it plans to achieve 20-minute truck turnaround times and an average of 30 moves per crane per hour.

B. MULTIMODAL TRANSPORT DEVELOPMENTS

Approximately 80 per cent of international trade is transported by sea. Of the remaining 20 per cent, a significant portion is transported by road, rail, and inland waterways. The following sections look at some of the major developments in these areas.

Road transport

This section provides an overview of trends in road freight transport. In particular, it summarizes recent trends in the sector's value and in the road networks, and provides future projections at the regional and country level.

Road freight shows varying trends, for those countries with available data. In mid-2010, freight volumes were at depressed levels compared with 2009, and the slowdown is expected to continue until 2013.

Sector value

The global trucking sector¹³ registered total revenues of \$2,308.3 billion in 2008 and a compound annual growth rate of 7.8 per cent for 2004–2008. The freight sector generated a total revenue of \$1,809.5 billion, equivalent to 78.4 per cent of the sector's overall value. Until 2008, the sector experienced strong growth, and then the global economic downturn began to affect the market in 2009. The share by value in 2008 was as follows – the Americas 49.20 per cent; Europe 26.50 per cent; and Asia-Pacific 24.20 per cent. From 2008 up to 2013, growth in this sector is forecast to slow to an annual rate of 5.1 per cent, generating revenues of \$2,965.7 billion by the end of 2013. The Asia-Pacific sector, in particular, is expected to grow at a higher level (9.4 per cent) during the same period, to reach a value of \$877.3 billion by 2013.¹⁴

Road networks

Road is the most dominant form of inland transport. The most extensive road networks in 2008 were found in the United States, followed by India, China, Brazil, Japan and Canada. The proportion of paved roads in the total road network varies widely, with a rate of nearly 100 per cent paved roads in several European countries (table 5.6). Figures 5.1, 5.2 and 5.3 show some of the main international road networks in Europe, Asia and Africa.

Regional and country projections¹⁵

The following section shows the trends in selected countries for which data are available. In 2007, the European Union (EU-27) transported 16,522 million tons of freight cargo by road. The highest amount was transported by Germany, with 2,848 million tons; when compared to Germany's figures for 2003, this represents an increase of 9 per cent. The next highest amount was transported by Spain, with 2,345 million tons (a 30 per cent increase); then France, with 2,191 million tons (a 15 per cent increase); and the United Kingdom, with 1,893 million tons (an 11 per cent increase). The highest growth rate in the 2003–2007 period was experienced by Greece (see fig. 5.4).¹⁶

Projections show that in Germany and France, road haulage will grow by 1.2 per cent and 1.4 per cent respectively in 2010. In the same year, road haulage is projected to grow by 1.8 per cent in Spain, but only by 0.3 per cent in the United Kingdom as a result of the unfavourable economic conditions.

In the United States, the amount of freight transported by road grew consistently from 2002 to 2008. Estimates indicate that truck cargo traffic will grow at an annual rate of 1.6 per cent until 2014, compared to a growth rate of 2.4 per cent in the rail sector, indicating a possible shift from road to rail. In China, road haulage is expected to increase at a rate of 8.5 per cent, compared to growth rates for rail and shipping estimated at 8.3 per cent and 5.4 per cent respectively. Forecasts for Taiwan Province of China show a moderate growth in road freight traffic of 3.1 per cent in 2010.

In the Russian Federation, the impact of the global economic crisis and the lack of new highway capacity are expected to restrict the growth of cargo traffic to 5 per cent in 2010. The predictions for Thailand show a low growth estimate of 4.3 per cent, in spite of expanding road capacity associated with the new highway links across the Mekong Delta which have opened up new export routes. In India, several road construction projects are in progress, and predictions are that road freight will grow at a high average rate of 11.7 per cent per year from 2010 until 2014.

With regard to South America, road freight in Brazil will grow at a slower pace than rail freight – at an average rate of 5.1 per cent for the year 2010. Brazil, Chile and the Plurinational State of Bolivia have recently announced construction of a highway linking Brazil's Atlantic port of Santos with Chile's Pacific coast ports of Iquique and Arica. The project will build about 3,700 kilometres of

Table 5.6. Road transportation systems of the world's top 25 economies, 2008

Rank in 2008 ^a	Country	Total roadways			Paved roadways	
		Population density (number of people per square kilometre)	Kilometres per capita (1 000 persons)	Roadway kilometres per square kilometre of land area	Kilometre per capita (1 000 persons)	Kilometres of roadway per square kilometre of land area
1	United States	34	21	0.71	13.7	0.46
2	Japan	349	9.4	3.28	7.5	2.6
3	China	140	1.4	0.2	1.2	0.16
4	Germany	236	7.8	1.85	7.8	1.85
5	France	116	14.9	1.73	14.9	1.73
6	United Kingdom	253	6.5	1.65	6.5	1.65
7	Italy	198	8.4	1.66	8.4	1.66
8	Russian Federation	9	6.7	0.06	5.4	0.05
9	Spain	81	16.8	1.37	16.8	1.37
10	Brazil	23	8.8	0.21	0.5	0.01
11	Canada	4	31.1	0.11	12.4	0.05
12	India	392	2.8	1.12	1.3	0.51
13	Mexico	57	3.2	0.18	1.6	0.09
14	Australia	0.4	105.8	0.04	44.4	0.02
15	Republic of Korea	501	2.1	1.06	1.7	0.83
16	Netherlands	493	8.1	4	6.8	3.33
17	Turkey	100	5.6	0.55	2.3	0.23
18	Poland	126	11	1.39	7.7	0.97
19	Indonesia	133	1.6	0.22	0.9	0.12
20	Belgium	344	14.6	5.03	11.4	3.93
21	Switzerland	190	9.4	1.78	9.4	1.78
22	Sweden	22	46.9	1.04	15.4	0.34
23	Saudi Arabia	13	7.7	0.1	1.7	0.02
24	Norway	15	19.9	0.31	15.5	0.24
25	Austria	100	13.1	1.3	13.1	1.3

Source: UNCTAD secretariat, based on United States Department of Transportation (2010). Freight transportation: Global highlights 2010.

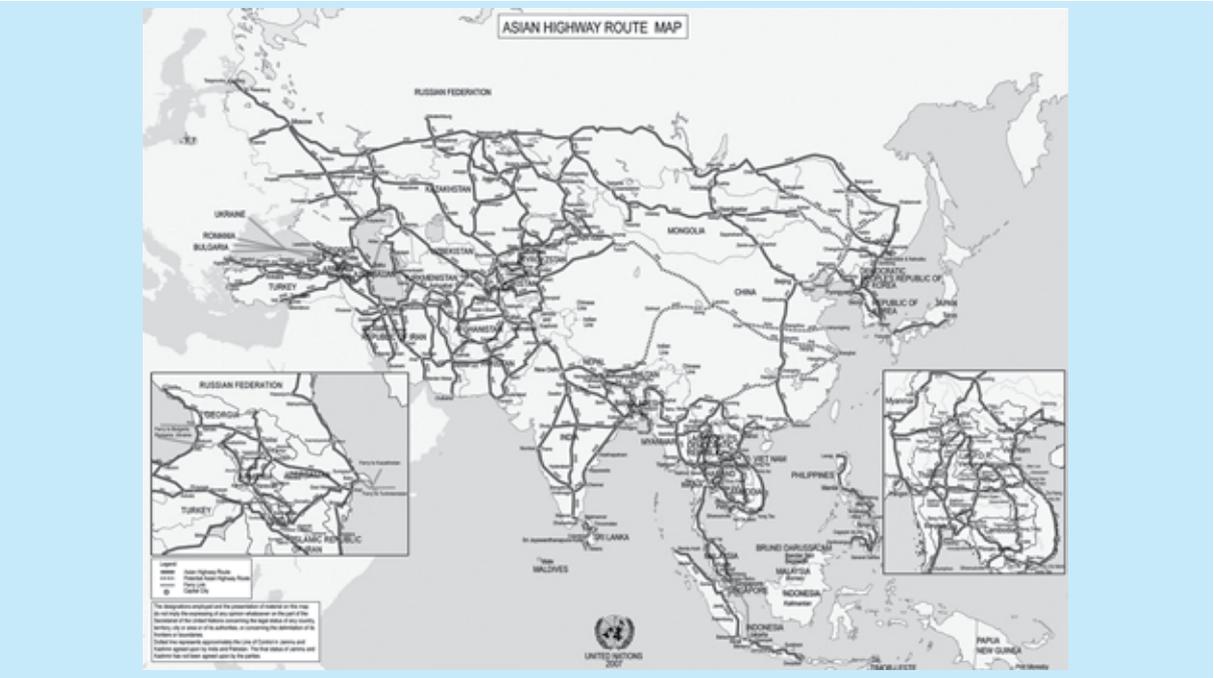
^a World's leading economies ranked by GDP.

Figure 5.1. Trans-European transport network



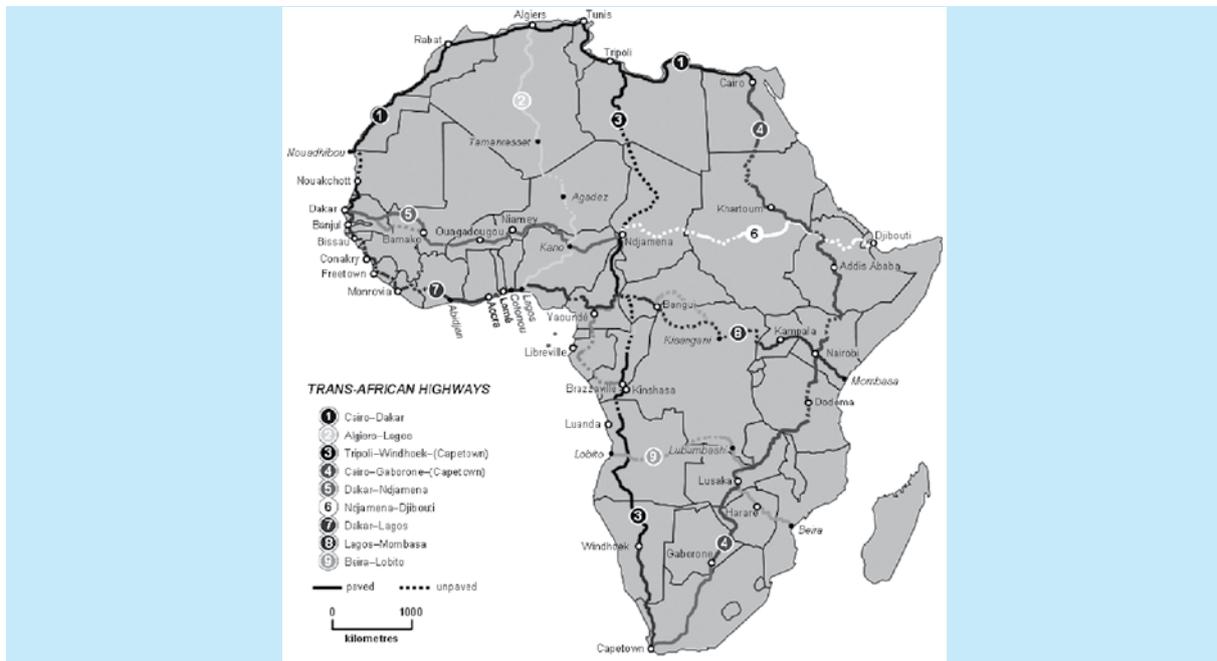
Source: [http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Trans-European_networks_in_transport_\(TEN-T\)](http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Trans-European_networks_in_transport_(TEN-T))

Figure 5.2. Map of Asian highways



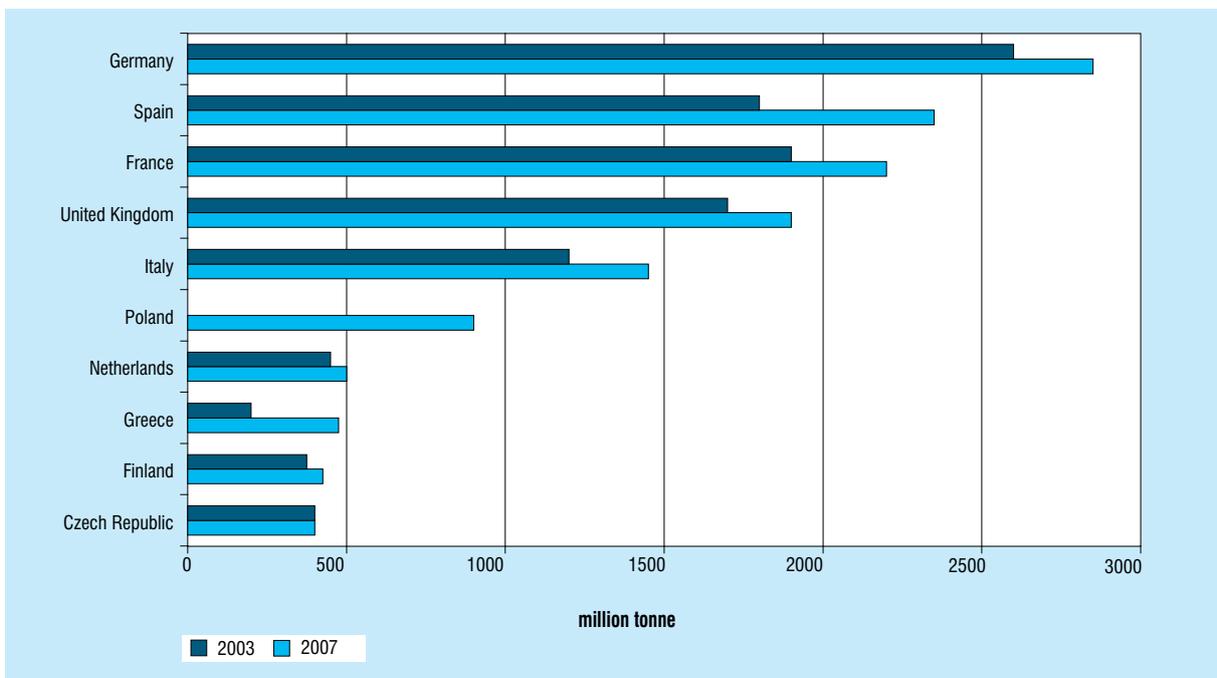
Source: ESCAP. Map available at <http://www.unescap.org/ttdw/common/TIS/AH/maps/AHMapApr04.gif>.

Figure 5.3. Trans-African highway network



Source: Wikipedia. Map available at http://en.wikipedia.org/wiki/Trans-African_Highway_network.

Figure 5.4. Transport of goods by road, EU-27 (the top 10 countries in 2007)



Source: UNCTAD secretariat, based on Energy, Transport and Environment Indicators, Eurostat 2009.

paved roads, of which 1,800 kilometres will be in the Plurinational State of Bolivia, with 1,500 kilometres in Brazil and 400 kilometres in Chile. Once the roads are in operation, road freight volumes are expected to rise.

Rail transport

This section provides an overview of trends in rail freight transport. In particular, it summarizes recent trends in the sector's revenues, the net tons transported, gauges, average haul distances, and the modal split.

Rail freight transport improved in the last quarter of 2009, according to preliminary reports.¹⁷ However, the figures show that recovery in rail freight is a distant prospect. Both road and rail freight volumes, in all countries for which data are available, were below their pre-crisis levels in the fourth quarter of 2009, especially when using seasonally adjusted quarterly estimations. Preliminary data for the year 2009 as a whole indicate a 23 per cent drop in rail ton-kilometres and more than a 21 per cent drop in road ton-kilometres in the European Union in 2009, compared to 2008. Rail freight data for the United States and the Russian Federation show declines of almost 14 per cent and 12 per cent respectively for the whole of 2009.¹⁸

Revenues

The railroad sector overall, including the transport of both goods and passengers, generated revenues of \$472.1 billion in 2007. This represented a compound annual growth rate of 6.3 per cent for the period 2003–2007.¹⁹ The rail freight sector generated \$192.6 billion, equivalent to 40.8 per cent of the sector's overall value. The Asia-Pacific region generated almost half of the sector's value, at 44.5 per cent, while Europe generated 35.7 per cent and the Americas 19.1 per cent.

Net tons transported and growth

Table 5.7 shows the compound growth rates for rail freight and for total freight transported. With the exception of the United States, annual rates of growth have been accelerating in recent years (2000–2007). The EU-10 and Japan both showed signs of slow growth in rail freight transport for the period 2000–2007. The United States showed growth rates for rail surpassing the growth rates for overall freight transport (1.8 per cent compared to 1.1 per cent) in 2000–2007. China, India and the Russian Federation showed strong growth rates for 2007–2007, above 6 per cent annually.

Table 5.8 shows the number of tons of freight transported per country, the gauge type, the total length of railway track, and average lengths of haul.²⁰

Railway track gauges are a measurement of the space between the inner sides of the two load-bearing parallel rails that together make up a single railway. The type of gauge is an indication of the competitiveness of a rail system, as, firstly, the wider the spacing of the rails is, the greater the railway's load capacity, and secondly, the less the gauges vary in the same network, the easier (and less costly) it is to exchange traffic by rail. Some countries, such as Argentina, Brazil and Japan, have a variety of gauges in the same network. The majority of the freight in the world (89 per cent of total ton-kilometres) is transported using either standard gauge (1435 mm) or the Russian broad gauge (1520 mm). However, many countries, especially in Africa and South America, use narrower gauges on their networks, representing a competitive disadvantage for them vis-à-vis other countries. By way of example, table 5.9 illustrates gauge breaks in the Trans-Asian Railway.

Table 5.7. Compound growth rates in transport (percentages)

	Rail freight transport (in millions of ton-kilometres)			Total freight transport (in millions of ton-kilometres)		
	1970 to 2007	1990 to 2007	2000 to 2007	1970 to 2007	1990 to 2007	2000 to 2007
China	5.30	4.90	8.00	8.60	7.90	11.60
EU-10	-1.50	-3.40	0.80	1.10	1.10	5.50
EU-15	0.50	0.70	1.90	2.60	2.40	2.50
India	5.50	4.80	7.60	6.80	5.30	8.90
Japan	-2.60	-0.90	0.80	1.70	1.30	1.70
Russian Federation	0.60	-1.10	6.20	1.30	-1.10	6.00
United States	2.20	3.00	1.80	2.20	2.00	1.10

Source: UNCTAD secretariat, based on Thompson L (2010). *A Vision for Railways in 2050*. International Transport Forum.

Table 5.8. Major world railway systems (2005 or latest available year)

	Gauge ^a	Year	Total Route km	Freight Tones (000 000)	Freight Tone-km (000 000)	Average Length of haul Freight (km)
China	Std	2005	62 200	2 309.20	1 934 612	838
Russian Federation	RB	2005	85 245	1 281.30	1 858.10	1 450
India		2007	63 273	727.7	480 993	661
Bulgaria	Std	2005	4 154	20.3	5 164	254
Czech Republic	Std	2005	9 513	75.8	14 385	190
Estonia	RB	2005	959	44.8	10 311	230
Hungary	Std	2005	7 730	44.0	8 537	194
Latvia	RB	2005	2 375	54.9	17 921	326
Lithuania	RB	2005	1 772	49.3	12 457	253
Poland	Std	2005	19 507	155.1	45 438	293
Romania	Std	2005	10 781	67.5	16 032	238
Slovakia	Std	2005	3 659	47.7	9 326	196
Slovenia	Std	2005	1 228	16.3	3 245	199
EU 10 Total			61 678	575.7	142 816	248
Austria	Std	2005	5 690	81.7	17 036	209
Belgium	Std	2005	3 542	61.0	8 130	133
Denmark	Std	2005	2 212			
Finland	Std	2005	5 732	40.7	9 706	238
France	Std	2005	29 286	129.7	41 898	323
Germany	Std	2005	34 218	274.6	88 022	321
Greece	Std	2005	2 576	3.0	613	204
Ireland	Std	2005	1 919	1.5	303	202
Italy	Std	2005	16 225	68.7	20 131	293
Netherlands	Std	2005	2 813	..	..	..
Portugal	B	2005	2 839	9.6	2 422	252
Spain	B	2005	14 484	29.7	11 586	390
Sweden	Std	2005	9 867	..	13 120	..
United Kingdom	Std	2005	15 810	103.9	22 110	213
EU 14 total			147 231	804.1	235 077	253
Canada: Canadian National	Std	2005	31 894	212.6	262 589	1 235
Canada: Canadian Pacific	Std	2005	21 962	120.4	183 100	1 520
Canada: Via Rail	Std	2005				
Mexico	Std	2005	15 747	59.6	72 159	1 210
United States: All class I railways	Std	2005	153 787	1 723.00	2 478 914	1 439
United States: Amtrak	Std	2005	1 100			
North America Total			224 490	2 115.70	2 996 762	1 416
JP conventional railways	C	2007	9 830	36.2	23 166	640
JP Shinkansen	Std	2007	2 387			
Japan Total			12 217	36.2	23 166	640

Table 5.8. Major world railway systems (2005 or latest available year) (continued)

	Gauge ^a	Year	Total Route km	Freight Tones (000 000)	Freight Tone-km (000 000)	Average Length of haul Freight (km)
Algeria	C	2005	3 572	8.3	1 471	177
Argentina						
AR FEPSA	B	2007	2 560	4.1	1 765	428
AR Ferrosur Roca	B	2007	2 650	5.5	2 076	376
AR NCA	B	2007	3 254	8.6	4 257	495
AR BAP (now ALL)	B	2007	3 000	4.4	3 140	720
AR All BG pax concessions	B	2007	687	..	..	..
AR Belgrano	M	2007	4 940	0.8	739	..
AR Mesopotámico	Std	2007	2 100	1 571.00	906	..
Armenia	RB	2005	711	2.6	654	250
Azerbaijan	RB	2005	2 122	26.5	10 067	379
Bangladesh	B	2005	2 855	3.2	817	255
Belarus	RB	2005	5 498	125.1	43 559	348
Brazil						
BR Tereza Christina	M	2007	235	2.6	200	..
BR EFVM Vitoria Minas	M	2007	6 303	136.8	75 500	..
BR MRS	B	2007	4 138	114.1	52 600	461
BR Bandeirantes	B	2007	899	3.5	1 900	543
BR EFC Carajas	B	2007	5 008	100.3	83 300	831
BR Ferronorte	B	2007	1 413	6.9	9 400	1 362
BR Centro Atlantico (FCA)	M	2007	5 940	19.0	14 400	..
BR Novoeste	M	2007	879	2.7	1 200	..
BR Nordeste	M	2007	1 755	1.8	1 000	..
BR ALL (old FSA)	M	2007	5 200	27.3	17 500	..
Cameroon	M	1998	1 006	1.9	1 076	581
Chile and the Plurinational State of Bolivia						
Antofagasta & Bolivia	M	1989	750	1.7	432	261
Bolivia-Andina Network	M	1995	2 274	0.6	314	493
Bolivia-Oriental Network	M	1995	1 424	0.8	464	595
Colombia	N	1996	3 154	1.6	471	296
Congo (CFCO)	Std	2005	795	0.6	231	385
Côte d'Ivoire	M	1995	639	0.5	312	645
Croatia	Std	2005	2 726	14.3	2 835	198
Cuba	Std	1998	4 667	4.4	732	166
Democratic Republic of the Congo	C	2005	3 641	1.2	444	370
Egypt	Std	2005	5 150	10.1	3 917	388
Gabon	Std	2004	731	3.5	1 949	557
Georgia	RB	2005	1 515	19.0	6 127	322
Ghana	C	2004	977	1.9	242	129

Table 5.8. Major world railway systems (2005 or latest available year) (concluded)

	Gauge ^a	Year	Total Route km	Freight Tones (000 000)	Freight Tone-km (000 000)	Average Length of haul Freight (km)
Indonesia	C	2000	8 500	18.0	4 698	261
Iran (Islamic Republic of)	Std	2005	7 131	30.3	19 127	631
Israel	Std	2005	899	7.5	1 149	153
Jordan	M+	2005	293	2.9	1 024	353
Kazakhstan	RB	2005	14 204	215.5	171 855	797
Kenya	M	2002	2 634	2.2	1 538	691
Malaysia	M	2005	1 667	4	1 178	295
Mali	M	2000	734	0.8	279	349
Mongolia	RB	2005	1 810	14.1	8 857	628
Myanmar	M	1991	3 336	1.8	449	256
New Zealand	C	1999	3 913	12.9	3 671	285
Nigeria	M	2000	3 557	0.1	105	827
Pakistan	B	2005	7 791	6.4	5 013	782
Peru	M	1996	1 691	1.5	453	296
Republic of Korea	Std	2005	3 392	44.5	10 108	227
Saudi Arabia	Std	2005	1 020	2.6	1 192	458
Senegal	M	2000	906	1.7	371	218
South Africa	C	2005	20 247	182.2	109 721	602
Sri Lanka	B	2005	1 200	1.5	135	90
Sudan	M	2005	5 478	1.3	766	589
Switzerland	Std	2005	3 011	56.2	8 571	153
Syrian Arab Republic	Std	2002	2 450	5.9	1 812	306
Thailand	M	2004	4 044	13.8	4 085	296
Tunisia	Std	2005	1 909	10.8	2 067	192
Turkey	Std	2005	8 697	18.9	9 078	479
Uganda	M	2004	259	0.9	218	241
Ukraine	RB	2005	22 001	462.4	223 980	484
United Republic of Tanzania (TRC)	M	2006	2 722	1.7	1 970	1 152
Uruguay	Std	2005	3 003	1.3	331	251
Uzbekistan	RB	2005	4 014	53.8	18 007	335
Viet Nam	M	2005	2 671	8.7	2 928	337
Zambia	C	1999	1 273	1.6	554	339
Zimbabwe	C	1997	2 759	12.0	4 871	406
World total			917 638	11 360.50	8 845 153	779

Source: UNCTAD secretariat, based on Thompson L (2010). *A Vision for Railways in 2050*. International Transport Forum.

^a	Gauges
Narrow (N)	914 mm
Metre (M)	1000 mm
Cape [C]	1067 mm
Standard (Std)	1435 mm
Russian Broad (RB)	1520 mm
Broad (B)	1676 mm

Table 5.9. Gauge breaks on the Trans-Asian Railway

	Break of Gauge	Gauge transition
Armenia	>> Turkey	1 520 mm <=> 1 435 mm
Azerbaijan	>> Iran (Islamic Republic of)	1 520 mm <=> 1 435 mm
China	>> Viet Nam	1 435 mm <=> 1 000 mm
China	>> Russian Federation	1 435 mm <=> 1 520 mm
China	>> Kazakhstan	1 435 mm <=> 1 520 mm
China	>> Mongolia	1 435 mm <=> 1 520 mm
Russian Federation	>> Democratic People's Republic of Korea	1 520 mm <=> 1 435 mm
Turkmenistan	>> Iran (Islamic Republic of)	1 520 mm <=> 1 435 mm

Source: UNCTAD secretariat, based on ESCAP's Review of Developments in Transport in Asia and the Pacific 2009.

Heavy concentration of rail traffic

Table 5.10 shows an important feature of the world's railways: high concentration. The top four railways of North America, China, the Russian Federation and India carry 82 per cent of the world's ton-kilometres. EU-10 and EU-15 account for a further 4.4 per cent share of total world rail freight traffic. In contrast, African railways carry only 1 per cent of the total ton-kilometres transported by rail worldwide (see fig. 5.5). While approximately 1 million kilometres of railways exist in the world, spread over more than 120 countries, the vast majority of operating activity is to be found in only a few countries.

Average haul distances

Average freight haul distances are shown in table 5.8. The size of the country influences the average haul, therefore countries with large expanses of land will register a longer average haul. It is widely considered that 300 kilometres is the minimum distance at which sufficient revenue is generated to offset the fixed costs

associated with rail transportation. In table 5.8, it can be seen that out of 115 systems, 34 have an average haul of less than 300 kilometres. Particularly long average hauls are found in the Russian Federation (1,450 kilometres), Mexico (1,210 kilometres), Canada (1,235 and 1,520 kilometres) and the United States (1,439 kilometres).

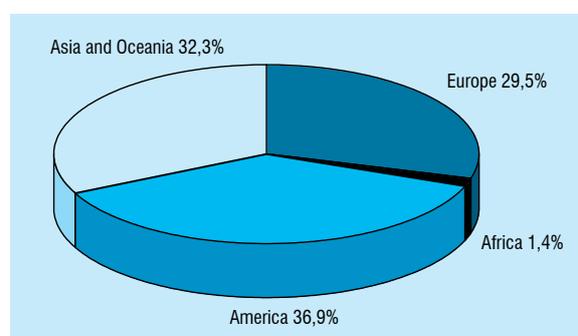
Modal split

Table 5.11 shows the modal split between rail and other forms of transport (inland waterways and roads). In 2007, the share of freight carried by rail varied from single digits in eight European countries and Japan, to almost 60 per cent in the Russian Federation. The share of freight carried by rail is strongly influenced by geography, with some exceptions. Countries with large expanses of land tend to rely more heavily on rail systems than smaller countries do, especially as the topography of small countries is often interrupted by internal geographical barriers such as mountains or lakes.

Table 5.10. Rail transport as a portion of total national transport, in several economies (percentages)

	1970	1990	2000	2006	2007
China	76.6	40.5	31.3	24.7	24.8
EU-10	77.3	63.0	40.5	31.0	29.3
EU-15	31.5	19.7	15.4	15.0	14.8
India	71.1	63.0	40.0	34.0	35.0
Japan	31.7	9.0	6.6	6.3	6.2
Russian Federation	76.2	59.0	58.6	57.5	59.3
United States	43.6	38.2	42.7	44.8	44.8

Source: UNCTAD secretariat, based on Thompson L (2010). *A Vision for Railways in 2050*. International Transport Forum.

Figure 5.5. Freight traffic trends around the world (in billions of ton-kilometres)

Source: UNCTAD secretariat, based on the 2008 annual report of the International Union of Railways.

Table 5.11. Modal split of inland freight transport: the share of rail, road and inland waterway transport in total inland transport (as a percentage of total ton-kilometres)

	2002				2007			
	Rail	Road	Inland water way	Total	Rail	Road	Inland water way	Total
EU-27	18	75	6	100	18	77	6	100
Austria	29	66	5	100	35	61	4	100
Belgium	11	78	12	100	13	71	16	100
Bulgaria	33	63	4	100	25	70	5	100
Croatia	23	76	1	100	25	74	1	100
Cyprus		100		100		100		100
Czech Republic	27	73	0	100	25	75	0	100
Denmark	8	92		100	8	92		100
Estonia	70	30		100	57	43		100
Finland	23	77	0	100	26	74	0	100
France	19	78	3	100	15	81	3	100
Germany	19	66	15	100	22	66	12	100
Greece	..	..	..	100	3	97		100
Hungary	28	66	6	100	21	74	5	100
Iceland		100		100		100		100
Ireland	3	97		100	1	99		100
Italy	10	90	0	100	12	88	0	100
Latvia	71	29		100	58	42		100
Liechtenstein	..	..	..	100	..	..	..	100
Lithuania	48	52	0	100	42	59	0	100
Luxembourg	6	91	4	100	4	93	3	100
Malta		100		100		100		100
Netherlands	3	63	33	100	6	61	33	100
Norway	15	85		100	15	85		100
Poland	37	62	1	100	26	74	0	100
Portugal	7	93		100	5	95		100
Romania	34	57	8	100	19	71	10	100
Slovakia	41	59	0	100	26	72	3	100
Slovenia	30	70		100	21	79		100
Spain	6	94		100	4	96		100
Sweden	34	66		100	36	64		100
Switzerland ^a	..	..	..	100	54	45	1	100
Turkey ^b	5	95		100	5	95		100
United Kingdom	10	90	0	100	13	87	0	100

Source: UNCTAD secretariat calculations, based on Eurostat, the Directorate-General for Energy and Transport (European Commission), the International Transport Forum, and national statistical estimates.

Note: Italic = estimates

^a The road transport data cover only haulage by Swiss vehicles on Swiss territory. Data taken from the Directorate-General for Energy and Transport.

^b In the case of road transport only, national transport data have been used.

A general trend observed since the 1970s is that the share of freight carried by rail has been consistently declining for all countries, with one exception – the United States – perhaps owing to the positive effect that transport deregulation has had on the rail sector.²¹

Inland waterways

This section provides an overview of trends in inland waterway transport, where data could be obtained. Inland waterways continue to account for a small portion of total goods transported internationally. Table 5.12 shows the breakdown between 2002 and 2007 for European countries. Based on their ton-kilometres,²² little change has been observed in the inland modal split since 2002. Inland waterways still account for around 6 per cent of total inland freight transport, whereas road transport accounts for over 75 per cent, and rail 19 per cent. Some notable exceptions can be found in the cases of Belgium (16 per cent), Germany (12 per cent), the Netherlands (33 per cent) and Romania (10 per cent), where the share of freight carried by inland waterway is significantly higher than the average.

Inland waterway networks for the top six countries (sorted by network length) are represented in table 5.13 and figure 5.6. China has the largest inland waterway system, with more than 5,600 navigable rivers, 2,000 inland ports, and 110,000 kilometres of navigable waters. In China, inland waterway developments are concentrated in five major areas: (a) the Yangtze River; (b) the Pearl River; (c) the Beijing–Hangzhou Grand Canal; (d) the Yangtze River Delta; and (e) the Pearl River Delta. The major investments are generally aimed at deepening waterways throughout the systems, and by-passing ship locking systems.²³ After China, the world's second largest network is in the Russian Federation, which has 102,000 kilometres of waterways. Brazil and the United States follow, with 50,000 and 41,000 kilometres of waterways respectively. Indonesia comes in fifth place, with 21,500 kilometres.

In China, freight transported along the Yangtze River – the world's busiest river by cargo volume – was estimated at 1.2 billion tons in 2009. Provisional data for 2010 suggest that the end-of-year total may reach 1.34 billion tons.²⁴ In India, the level of freight transportation by inland waterway is negligible, especially when compared to the European Union, the United States, and China. The total cargo moved (in ton-kilometres) by inland waterway is about 0.1 per

**Table 5.12. Freight transport via inland waterways
(in millions of ton-kilometres)**

	2000	2007	2008	Percentage change
Austria	2.4	2.6	2.4	-9.2
Azerbaijan	n.a.	6	6.1	1.1
Belarus	0	0.1	0.1	41.9
Belgium	7.3	9	8.7	-2.9
Bulgaria	0.4	1.7	1.9	13.2
Canada	25.4	29.4	n.a.	..
Croatia	0.1	0.1	0.1	-27.5
Czech Republic	0.8	0.9	0.9	-3.9
Estonia	0	0	0	
EU 26	134.7	140.2	142.7	1.8
Finland	0.1	0.1	0.1	0
France	9.1	8.8	8.6	-3.1
Germany	66.5	64.7	64.1	-1
Hungary	0.9	2.2	2.3	1.7
Italy	0.2	0.1	n.a.	
Latvia	n.a.	n.a.	n.a.	
Lithuania	0	0	0	18.2
Luxembourg	0.4	0.3	0.4	6.1
Netherlands	41.3	41.9	46	9.9
Poland	1.2	1.3	1.3	-4.8
Republic of				
Moldova	n.a.	0	0	0
Romania	2.6	5.3	4.9	-7.5
Russian Federation	71	86	63.7	-25.9
Serbia	1	1.6	1.4	-13.6
Slovakia	1.4	1	1.1	9.7
Switzerland	0.1	0.1	n.a.	..
Ukraine	5.9	5.7	n.a.	..
United Kingdom	0.2	0.1	0.2	14.3
United States	441.7	396.6	n.a.	..

Source: UNCTAD secretariat based on data supplied by the International Transport Forum (2010) *Trends in the Transport Sector*.

Note: Non-availability of data affects totals.

EU (26) refers to the 27 European Union countries minus Cyprus which is not a member of the International Transport Forum.

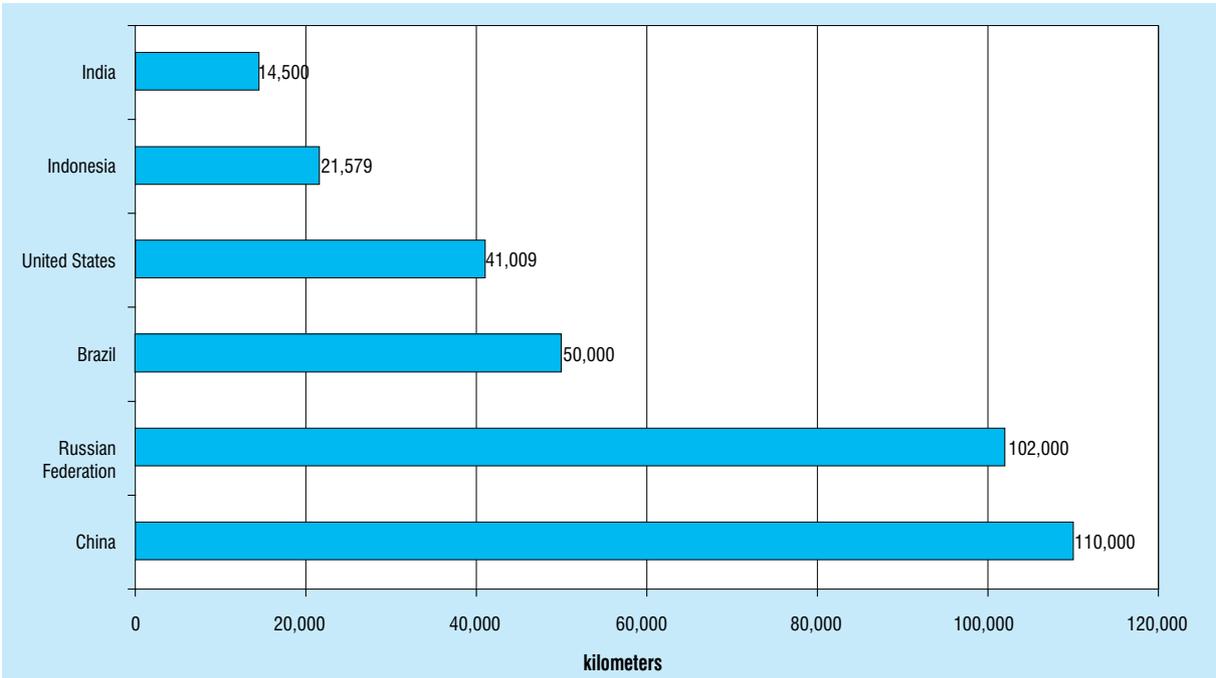
Table 5.13. Extent of physical transportation systems in the world's top economies, in 2008

Ranked by total length of roadways	Roadways		Railways (km)	Waterways (km)	Pipelines (km)	Airports (number)
	Total (km)	Paved roads (km)				
United States	6 465 799	4 209 835	226 427	41 009	793 285	5 146
India	3 316 452	1 517 077	63 327	14 500	22 773	251
China	1 930 544	1 575 571	77 834	110 000	58 082	413
Brazil	1 751 868	96 353	28 857	50 000	19 289	734
Japan	1 196 999	949 101	23 506	1 170	4 082	144
Canada	1 042 300	415 600	46 688	636	98 544	514
France	951 500	951 500	29 213	8 501	22 804	295
Russian Federation	933 000	754 984	87 157	102 000	246 855	596
Australia	812 972	341 448	37 855	2 000	30 604	462
Spain	681 224	681 224	15 288	1 000	11 743	154
Germany	644 480	644 480	41 896	7 467	31 586	331
Italy	487 700	487 700	19 729	2 400	18 785	101
Turkey	426 951	177 500	8 697	1 200	11 191	103
Sweden	425 300	139 300	11 633	2 052	786	249
Poland	423 997	295 356	22 314	3 997	15 792	126
United Kingdom	398 366	398 366	16 454	3 200	12 759	312
Indonesia	391 009	216 714	8 529	21 579	13 752	669
Mexico	356 945	178 473	17 516	2 900	40 016	243
Saudi Arabia	221 372	47 529	1 392	...	8 662	215
Belgium	152 256	119 079	3 233	2 043	2 023	42
Netherlands	135 470	113 018	2 811	6 215	4 897	27
Austria	107 262	107 262	6 399	358	3 541	55
Republic of Korea	103 029	80 642	3 381	1 608	2 250	113
Norway	92 946	72 033	4 114	1 577	95	98
Switzerland	71 298	71 298	4 888	65	1 763	66

Source UNCTAD secretariat, on the basis of data from the United States Department of Transportation in *Freight Transportation: Global Highlights 2010* and Central Intelligence Agency in *World Factbook 2009*.

Note: The United States has the world's most extensive freight transportation network, when measured by the number of kilometres of public-use paved roads, railways, waterways and pipelines, and also by the number of airports.

Figure 5.6. Inland water navigation systems (top six countries), (length in kilometres)



Source: UNCTAD secretariat, based on United States Department of Transportation (2010). Freight transportation: Global highlights 2010.

cent of the total inland traffic in India, compared to 6 per cent in the European Union, or 21 per cent in the United States.²⁵

Table 5.12 shows the ton-kilometres transported in 2000, 2007 and 2008, for selected economies. In the EU-26 (the 27 European Union countries minus Cyprus), a total of 143 million ton-kilometres were transported in 2008, which represented an annual growth rate of 1.8 per cent compared to 2007.²⁶ In the United States, 397 million ton-kilometres were transported in 2007, whereas in the Russian Federation there was a significant decrease, from

86 million ton-kilometres in 2007 to 64 million ton-kilometres in 2008. Double-digit negative growth rates were recorded in 2008 for Croatia (-27.5 per cent), the Russian Federation (-25.9 per cent) and Serbia (-13.6 per cent).

What these general trends tend to indicate is that in spite of the effects of the global crisis, the share of inland waterway transport in global transport is negligible, and that its trends do not significantly affect the overall trends reviewed. For the immediate future, the inland leg for maritime freight will continue to be dominated mainly by road and rail (and in a few cases, by air).

ENDNOTES

- ¹ Due to variations in calculation methods and reporting periods, the 2009 data are preliminary.
- ² COSCO Pacific 2009 final results, 30 March 2010.
- ³ See annex IV.
- ⁴ For the list of countries in each country grouping, see annex I. For the list of LDCs, see the United Nations Office of the High Representative for Least Developed Countries, Landlocked Developing Countries and Small Island Developing States, at <http://www.unohrrls.org/en/ldc/related/62/>.
- ⁵ See also "Ports and international transport costs" in UNCTAD's Transport Newsletter, no. 31, first quarter 2006; and "Trade, liner shipping supply, and maritime freight rates" in Transport Newsletter, no. 33, third quarter 2006. Available at <http://www.unctad.org/transportnews>.
- ⁶ <http://www.jamaica-gleaner.com/gleaner/20100209/shipping/shipping1.html> (accessed 23 June 2010).
- ⁷ http://www.apmterminals.com/uploadedFiles/corporate/Media_Center/Press_Releases/090618%20New%20Productivity%20Record%20for%20APM%20Terminals%20Apapa.pdf (accessed 23 June 2010).
- ⁸ <http://www.gulf-daily-news.com/source/XXXIII/065/pdf/page24.pdf> (accessed 23 June 2010).
- ⁹ <http://www.ameinfo.com/206074.html> (accessed 23 June 2010).
- ¹⁰ <http://www.transportweekly.com/pages/en/news/articles/66364/> (accessed 23 June 2010).
- ¹¹ http://cpa.gov.bd/index.php?option=com_content&view=article&id=102&Itemid=44 (accessed 23 June 2010).
- ¹² http://www.facebook.com/note.php?note_id=372826574423 (accessed 25 November 2010).
- ¹³ Includes freight and passenger transport by road.
- ¹⁴ Source: Datamonitor (2009). *Global Trucking*. August. The value of the freight segment is calculated on the basis of total road freight volume multiplied by average annual price per ton-kilometre. All currency conversions are at constant average annual 2008 exchange rates.
- ¹⁵ Business Monitor International (2010). Based on Freight Transport Reports for various countries.
- ¹⁶ Source: Eurostat. Energy, transport and environment indicators, 2009.
- ¹⁷ International Transport Forum, May 2010.
- ¹⁸ Ibid.
- ¹⁹ A compound annual growth rate (CAGR) is defined as the year-on-year growth rate of an investment over a specified period of time.
- ²⁰ For 2005, or the year of latest available data.
- ²¹ The Staggers Act (1981).
- ²² One net ton of freight transported for one kilometre. Ton-kilometres provide a measure of the work done by the transport system: they include the weight of the freight and exclude the weight of the railway wagon.
- ²³ Initiatives include the Three Gorges project, aimed at improving electric power supply and navigation safety, and reducing transport costs; and the development along the Hang Yong Canal, connecting a network of six rivers with the country's largest river.
- ²⁴ World Cargo News (2010). Yangtze cargo volumes soar. May: 26.
- ²⁵ Source: Wikipedia.
- ²⁶ Source: Eurostat (2009). Energy, transport and environment indicators.
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