



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Fachgebiet
Verkehrsplanung
und Verkehrstechnik

First Review of Available Data: Modal Split in Different Countries

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First Review of Available Data: Modal Split in Different Countries

Contribution to the WG 1 Report
Towards a Multimodal Approach of the Transport System

AICPR/PIARC C4
Technical Committee on Interurban Roads and Integrated Interurban Transport

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1 Subject

To serve as basis for consideration of the role of transport in a multimodal context, the subject of this survey is the actual state of multimodal transport systems in different countries. This includes the volume of transport and the performance of transport systems as well as the modal split in dependence on geographical, economical and social conditions.

In the first step actual data has to be collected about transport infrastructure (network length and density), transport production, and modal split. Available compilations have to be analysed (comp. draft plan of PIARC C4 meeting in Weinfelden, July 2000).

2 Sources

2.1 General

Sources containing comprehensive compilations of the required data were not able to be found. Available statistics cover a specific selection of countries (e.g. European Union, North America, States of ,G7') or a part of transport topics only (e.g. network length). References indicate that data is taken from national databases or publications of international authorities (e.g. EUROSTAT – European Union).

Some national statistic authorities provide singular country data on transport system and performance in the internet. Otherwise data can also be ordered by mail. For extended research it would be necessary to get more detailed information from local authorities.

2.2 Data Difficulties and Limitations

Enquiries about transport volume and performance data on international level involve difficulties. The UNITED STATES BUREAU OF TRANSPORTATION STATISTICS remarks on this matter:

„Inconsistent and inadequate data hamper the comparison of transportation systems and policies across countries. (...) The two main categories of data problems are availability and methodology. Industrialized countries, including the United States, Japan and Western Europe, have data that are relatively comprehensive and readily available. Developing country data are often less

accessible and much less extensive. A few organizations develop and publish detailed and somewhat comparable sets of trend statistics. These are often limited, however, to a specific mode. Without such cross-country statistical sources, national data must be used, where available. This can be a complex undertaking, because transportation-related datasets may be provided by more than one government agency.

The availability of passenger and freight data varies by data category. In general, passenger data are more robust and usually include several indicators such as passenger- or vehicle-kilometres traveled, or numbers of vehicles, although more data are available for road transportation than for other modes. In contrast, data on freight transportation are often limited to indicators of metric ton-kilometres and modal share. (...)

In addition to the lack of data, definitions and collection methodologies differ among countries. For example, countries generally collect travel data through national surveys and may define the term „trip“ differently, which affects response rates. Collection methodologies in some countries may lead to an underreporting of modes such as bicycling and walking. (...)

In the present case similar difficulties have to be handled, especially with the aim of ascertaining modal share:

- Lack of data: depending on the inquiry methods data of specific transport modes or total amounts of transport volume and performance are sometimes missing. Especially passenger transport statistics often contain public transport only. This leads to inaccuracies in modal shares and incomparability of the results.
- Different year of data reference both among different countries and transport modes may lead to the need of using less actual data than available.
- Varying definition and division of transport modes by technical and legal aspects and missing indicators on this, e.g. classification of tramway as road or rail transport, hinder an accurate and comparable classification.
- Informations to the delimitation between domestic and international transport are not given.
- Statistics often combine transport volume and transport performance data.

The survey below contains information about important sources which provide multi-national data. They may be starting-points for extended research. The complete list of sources used for the first analysis is given in chapter 4.

2.3 BTS: Worldwide Transportation Directory **(www.bts.gov/itt/wtd) [1]**

Actual edition: 1997; online available. Published by Bureau of Transportation Statistics, USA.

Contains most important data on transport infrastructure for all countries of the world (see table 1) with year of reference 1995: network length of railways, roads (classified in quality of surface), inland waterways and pipelines, number of seaports and airports (classified in runway length).

Over and above that the directory contains addresses of contact persons in national statistic authorities, specified on transport modes and multimodal matters.

2.4 BTS: Transportation Statistics Annual Report **(www.bts.gov/itt/tsar) [2]**

Actual edition: 1999; online available. Published by Bureau of Transportation Statistics, USA.

Annual report, each focused on a specific topic of transportation, mostly restricted on the USA. The 1997 edition „Mobility and Access“ chapter „Global Trends: Passenger Mobility and Freight Activity“ contains requested data of about 15 selected countries (see figures 5 and 8).

2.5 BTS: North American Transportation Statistics **(www.bts.gov/itt/nats) [3]**

Actual edition: 1994, online available. Published by Bureau of Transportation Statistics, USA.

Contains a summary of transport system and performance of Canada, USA and Mexico. Year of data reference: 1989 to 1994.

2.6 IRF: World Road Statistics (www.irfnet.org) [4]

Actual edition: 2000, online not available. Published by International Road Federation, Geneva.

By own account the only world wide compilation of road transport and vehicle statistics, often in use as a source. Could not be analysed for this review.

2.7 EUROSTAT: Yearbook 2000 [16]

Actual edition: 2000; Published by Eurostat, Luxemburg.

Contains data on transport infrastructure and freight transport for the member states of European Union, but no data on passenger transport.

2.8 United Nations: Monthly Bulletin of Statistics (<http://esa.un.org/unsd/mbsdemo/mbssearch.asp>) [6]

Published by United Nations Statistics Division. Online-database.

Contains data on civil aviation cargo and passenger, international maritime goods loaded and unloaded, railway net ton kilometres and passenger kilometres.

2.9 International link lists

Online link lists of the Federal Statistic Department of Germany (www.statistik-bund.de/allg/d/link/link986.htm), the Federal Statistic Department of Switzerland (www.statistik-admin.ch) or the United Nations (www.unece.org/stats/links.thm). Links to statistic authorities of many countries.

3 Data

3.1 Transport Infrastructure

Transport infrastructure is described by length of network of the different transport modes (railway, road, waterways and pipelines) as well as by the number of airports and other access facilities to transport systems. To assess the state of development of transport systems you have to refer data on exposition units as area and population.

Table 1 contains data on area, population and transport infrastructure. Table 2 and Figures 1 to 3 contain informations about network density.

Table 1: Area, Population and Transport Infrastructure. State of data: 1995 [1]

	Total Area [sq km]	Population July 1995 (est.)	Railroads [km]	Roads [km]	Inland Waterways [km]	Pipelines [km]	Airports (total)
North America							
CANADA	9.976.140	28.434.545	78.148	849.404	3.000	98.544	1.386
MEXICO	1.972.550	93.985.848	24.500	242.300	2.900	53.004	2.055
UNITED STATES	9.372.610	263.814.032	240.000	6.243.163	41.009	607.000	15.032
Central America							
COSTA RICA	51.100	3.419.114	950	35.560	730	176	174
CUBA	110.860	10.937.635	12.623	26.477	240	-	181
DOMINICAN REPUBLIC	48.730	7.511.263	1.655	12.000		104	36
EL SALVADOR	21.040	5.870.481	602	10.000		-	106
GUATEMALA	108.890	10.998.602	1.019	26.429	990	275	528
HAITI	27.750	6.539.983	40	4.000	100	-	14
HONDURAS	112.090	5.459.743	785	8.950	465	-	159
JAMAICA	10.990	2.574.291	370	18.200		10	41
NICARAGUA	129.494	4.206.353	376	15.286	2.220	56	198
PANAMA	78.200	2.680.903	238	8.530	882	130	115
South America							
ARGENTINA	2.766.890	34.292.742	34.572	208.358	11.000	16.908	1.602
BOLIVIA	1.098.580	7.896.254	3.684	42.815	10.000	3.875	1.382
BRAZIL	8.511.965	160.737.489	30.612	1.670.148	50.000	6.899	3.467
CHILE	756.950	14.161.216	7.766	79.599	725	1.860	390
COLUMBIA	1.138.910	36.200.251	3.386	107.377	14.300	5.890	1.307
ECUADOR	283.560	10.890.950	965	43.709	1.500	2.158	175
PARAGUAY	406.750	5.358.198	970	28.300	3.100	-	929
PERU	1.285.220	24.087.372	1.801	69.942	8.808	864	236
URUGUAY	176.220	3.222.716	3.000	49.900	1.600	-	85
VENEZUELA	912.050	21.004.773	542	81.000	7.100	10.860	431



	Total Area [sq km]	Population July 1995 (est.)	Railroads [km]	Roads [km]	Inland Waterways [km]	Pipelines [km]	Airports (total)
Europe							
ALBANIA	28.750	3.413.904	543	18.450	43	264	11
AUSTRIA	83.850	7.986.664	5.624	110.000	446	3.336	55
BELARUS	207.600	10.437.418	5.570	98.200	NA	4.550	118
BELGIUM	30.510	10.081.880	3.410	137.912	2.043	4.628	43
BOSNIA AND HERZEGOVINA	51.233	3.201.823	1.021	21.168	NA	264	27
BULGARIA	110.910	8.775.198	4.294	36.932	470	2.118	355
CROATIA	56.538	4.665.821	2.699	27.368	785	1.000	76
CZECH REPUBLIC	78.703	10.432.774	9.434	55.890	NA	5.400	116
DENMARK	43.070	5.199.437	2.838	71.042	417	1.388	118
ESTONIA	45.100	1.625.399	1.030	30.300	500	420	22
FINLAND	337.030	5.085.206	5.864	76.755	6.675	580	159
FRANCE	547.030	58.109.160	34.074	1.511.200	14.932	32.292	476
GERMANY	356.910	81.337.541	43.457	636.282	7.541	105.154	660
GREECE	131.940	10.647.511	2.503	130.000	405	573	79
HUNGARY	93.030	10.318.838	7.785	158.711	1.622	5.591	78
IRELAND	70.280	3.550.448	1.947	92.327		225	44
ITALY	301.230	58.261.971	19.503	305.388	2.400	23.251	138
LATVIA	64.100	2.762.899	2.400	59.500	300	2.090	50
LITHUANIA	65.200	3.876.396	2.010	44.200	600	865	96
MACEDONIA	25.333	2.159.503	922	10.591	0	-	16
MOLDOVA	33.700	4.489.657	1.150	20.000		310	26
NETHERLANDS	37.330	15.452.903	2.757	104.831	6.340	11.613	29
NORWAY	324.220	4.330.951	4.026	88.922	1.577	53	104
POLAND	312.680	38.792.442	25.528	367.000	3.997	6.946	134
PORTUGAL	92.080	10.562.388	3.068	70.176	820	80	65
ROMANIA	237.500	23.198.330	11.365	461.880	1.724	10.629	156
SERBIA AND MONTENEGRO	102.350	11.101.833	3.960	46.019	NA	2.655	54
SLOVAKIA	48.845	5.432.383	3.660	17.650	NA	2.700	37
SLOVENIA	20.296	2.051.522	1.201	14.726	NA	595	14
SPAIN	504.750	39.404.348	14.400	331.961	1.045	3.725	106
SWEDEN	449.964	8.821.759	12.000	135.859	2.052	84	253
SWITZERLAND	41.290	7.084.984	5.763	71.118	65	1.820	69
UKRAINE	603.700	51.867.828	23.350	273.700	1.672	11.730	706
UNITED KINGDOM	244.820	58.295.119	16.888	360.047	2.291	16.726	505
Oceania							
AUSTRALIA	7.686.850	18.322.231	40.478	837.872	8.368	8.600	480
NEW ZEALAND	268.680	3.407.277	4.716	92.648	1.609	1.310	102
PAPUA NEW GUINEA	461.690	4.294.750	0	19.200	10.940	-	505

	Total Area [sq km]	Population July 1995 (est.)	Railroads [km]	Roads [km]	Inland Waterways [km]	Pipelines [km]	Airports (total)
Asia							
AFGHANISTAN	647.500	21.251.821	24,6	21.000	1.200	180	48
ARMENIA	29.800	3.557.284	840	11.300	NA	900	11
AZERBAIJAN	86.600	7.789.886	2.090	36.700		3.000	69
BANGLADESH	144.000	128.094.948	2.892	7.240	5.150	1.220	16
BHUTAN * See footnote	47.000	1.780.638	0	2.165		-	2
CAMBODIA	181.040	10.561.373	655	34.100	3.700	-	22
CHINA, PEOPLE REPUBLIC OF	9.596.960	1.203.097.268	65.780	1.029.000	109.800	17.000	204
GEORGIA	69.700	5.725.972	1.570	33.900		1.110	28
INDIA	3.287.590	936.545.814	62.211	1.970.000	16.180	6.102	352
INDONESIA	1.919.440	203.583.886	6.964	119.500	21.579	4.664	450
IRAN	1.648.000	64.625.455	4.850	140.200	904	14.350	261
IRAQ	437.072	20.643.769	2.457	45.550	1.015	6.435	121
ISRAEL	21.130	5.433.134	520	13.461		1.087	58
JAPAN	377.835	125.506.492	27.327	1.111.974	1.770	2.206	175
JORDAN	89.213	4.100.709	789	7.500		209	17
KAZAKHSTAN	2.717.300	17.376.615	14.460	189.000		7.830	352
KUWAIT	17.820	1.817.397	0	4.270		1.082	8
KYRGYZSTAN	198.500	4.769.877	370	30.300		200	54
LAOS	236.800	4.837.237	0	14.130	7.484	136	52
LEBANON	10.400	3.695.921	222	7.300		72	9
MALAYSIA	329.750	19.723.587	1.801	29.028	7.296	1.686	115
MONGOLIA	1.565.000	2.493.615	1.750	46.700	397	-	34
MYANMAR	678.500	45.103.809	3.991	27.000	12.800	1.673	80
NEPAL	140.800	21.560.869	101	7.400		-	44
NORTH KOREA	120.540	23.486.550	4.915	30.000	2.253	37	49
OMAN	212.460	2.125.089	0	26.000		2.330	140
PAKISTAN	803.940	131.541.920	8.773	177.410		5.179	119
PHILIPPINES	300.000	73.265.584	800	160.700	3.219	357	269
RUSSIA	17.075.200	149.909.089	154.000	934.000	101.000	203.000	2.517
SAUDI ARABIA	1.960.582	10.729.576	1.390	151.530		8.750	211
SOUTH KOREA	98.480	45.553.882	6.763	63.200	1.609	455	114
SRI LANKA	65.610	18.342.660	1.948	75.263	430	62	14
SYRIA	185.180	15.451.917	1.998	31.569	870	1.819	107
TAIWAN	35.980	21.500.583	4.600	20.041		712	41
TAJKISTAN	143.100	6.155.474	480	29.900		400	59
THAILAND	514.000	60.271.300	3.940	77.697	3.999	417	105
TURKEY	780.580	63.405.526	10.413	320.611	1.200	4.767	116
TURKMENISTAN	488.100	4.075.316	2.120	23.000		4.650	64
UNITED ARAB EMIRATES	75.581	2.924.549	0	2.000		1.700	41
UZBEKISTAN	447.400	23.089.261	3.460	78.400		1.100	261
VIETNAM	329.560	74.393.324	3.059	85.000	17.702	150	48
YEMEN	527.970	14.728.474	0	51.390		676	46

	Total Area [sq km]	Population July 1995 (est.)	Railroads [km]	Roads [km]	Inland Waterways [km]	Pipelines [km]	Airports (total)
Africa							
ALGERIA	2.381.740	28.539.321	4.733	95.576		9.858	139
ANGOLA	1.246.700	10.069.501	3.189	73.828	1.295	179	289
BENIN	112.620	5.522.677	578	8.432		-	7
BOTSWANA	600.370	1.392.414	888	11.514		-	100
BURKINA	274.200	10.422.828	620	16.500		-	48
BURUNDI	27.830	6.262.429	0	5.900		-	4
CAMEROON	475.440	13.521.000	1.111	65.000	2.090	-	60
CENTRAL AFRICAN REPUBLIC	622.980	3.209.759	0	22.000	800	-	61
CHAD	1.284.000	5.586.505	0	31.322	2.000	-	66
CONGO, THE	342.000	2.504.996	797	11.960	1.120	25	41
COTE D'IVOIRE	322.460	14.791.257	660	46.600	980	-	40
EGYPT	1.001.450	62.359.623	4.895	47.387	3.500	2.227	91
ERITREA	121.320	3.578.709	307	3.845		-	20
ETHIOPIA	1.127.127	55.979.018	681	24.127		-	98
GABON	267.670	1.155.749	649	7.500	1.600	284	69
GHANA	238.540	17.763.138	953	32.250	1.293	-	12
GUINEA	245.860	6.549.336	1.048	30.100	1.295	-	15
GUINEA-BISSAU	36.120	1.124.537	0	3.218		-	32
KENYA	582.650	28.817.227	2.650	64.540		483	246
LESOTHO	30.350	1.992.960	2,6	7.215		-	29
LIBERIA	111.370	3.073.245	490	10.087		-	59
LIBYA	1.759.540	5.248.401	0	19.300	0	6.773	146
MADAGASCAR	587.040	13.862.325	1.020	40.000		-	138
MALAWI	118.480	9.808.384	789	13.135	144	-	47
MALI	1.240.000	9.375.132	642	15.700	1.815	-	33
MAURITANIA	1.030.700	2.263.202	690	7.525		-	28
MOROCCO	446.550	29.168.848	1.893	59.474		1.094	74
MOZAMBIQUE	801.590	18.115.250	3.288	26.498	3.750	595	192
NAMIBIA	825.418	1.651.545	2.341	54.500		-	135
NIGER	1.267.000	9.280.208	0	39.970	300	-	29
NIGERIA	923.770	101.232.251	3.567	107.990	8.575	5.542	80
RWANDA	26.340	8.605.307	0	4.885		-	7
SENEGAL	196.190	9.007.080	905	14.007	897	-	24
SIERRA LEONE	71.740	4.753.120	84	7.400	800	-	11
SOMALIA	637.660	7.347.554	0	22.500		15	76
SOUTH AFRICA	1.219.912	45.095.459	20.638	188.309		3.001	853
SUDAN	2.505.810	30.120.420	5.516	20.703	5.310	815	70
TANZANIA	945.090	28.701.077	2.600	81.900		982	108
TOGO	56.790	4.410.370	532	6.462	50	-	9
TUNISIA	163.610	8.879.845	2.260	29.183		1.625	31
UGANDA	236.040	19.573.262	1.300	26.200		-	29
ZAIRE	2.345.410	44.060.636	5.138	146.500	15.000	390	270
ZAMBIA	752.610	9.445.723	1.273	36.370	2.250	1.724	113
ZIMBABWE	390.580	11.139.961	2.745	85.237		212	471

Table 2: Network Density. Source of data: [1], own edition.

	Railway [km] per 1000 sq km	Highway [km] per 1000 sq km	Inl. Water- way [km] per 1000 sq km	Pipeline [km] per 1000 sq km	Area [sq km] per Airport	Railway [km] per 1 mill pop.	Highway [km] per 1 mill pop.	Inl. Water- way [km] per 1 mill pop.	Pipeline [km] per 1 mill pop.	Pop. [1000] per Airport
North America										
CANADA	7,83	85,14	0,30	9,88	7.198	2.748	29.872	106	3.466	21
MEXICO	12,42	122,84	1,47	26,87	960	261	2.578	31	564	46
UNITED STATES	25,61	666,11	4,38	64,76	624	910	23.665	155	2.301	18
Central America										
COSTA RICA	18,59	695,89	14,29	3,44	294	278	10.400	214	51	20
CUBA	113,86	238,83	2,16	-	612	1.154	2.421	22	-	60
DOMINICAN REPUBLIC	33,96	246,25	-	2,13	1.354	220	1.598	-	14	209
EL SALVADOR	28,61	475,29	-	-	198	103	1.703	-	-	55
GUATEMALA	9,36	242,71	9,09	2,53	206	93	2.403	90	25	21
HAITI	1,44	144,14	3,60	-	1.982	6	612	15	-	467
HONDURAS	7,00	79,85	4,15	-	705	144	1.639	85	-	34
JAMAICA	33,67	1.656,05	-	0,91	268	144	7.070	-	4	63
NICARAGUA	2,90	118,04	17,14	0,43	654	89	3.634	528	13	21
PANAMA	3,04	109,08	11,28	1,66	680	89	3.182	329	48	23
South America										
ARGENTINA	12,49	75,30	3,98	6,11	1.727	1.008	6.076	321	493	21
BOLIVIA	3,35	38,97	9,10	3,53	795	467	5.422	1.266	491	6
BRAZIL	3,60	196,21	5,87	0,81	2.455	190	10.391	311	43	46
CHILE	10,26	105,16	0,96	2,46	1.941	548	5.621	51	131	36
COLUMBIA	2,97	94,28	12,56	5,17	871	94	2.966	395	163	28
ECUADOR	3,40	154,14	5,29	7,61	1.620	89	4.013	138	198	62
PARAGUAY	2,38	69,58	7,62	-	438	181	5.282	579	-	6
PERU	1,40	54,42	6,85	0,67	5.446	75	2.904	366	36	102
URUGUAY	17,02	283,17	9,08	-	2.073	931	15.484	496	-	38
VENEZUELA	0,59	88,81	7,78	11,91	2.116	26	3.856	338	517	49
Oceania										
AUSTRALIA	5,27	109,00	1,09	1,12	16.014	2.209	45.730	457	469	38
NEW ZEALAND	17,55	344,83	5,99	4,88	2.634	1.384	27.191	472	384	33
PAPUA NEW GUINEA	-	41,59	23,70	-	914	-	4.471	2.547	-	9

	Railway [km] per 1000 sq km	Highway [km] per 1000 sq km	Inl. Water- way [km] per 1000 sq km	Pipeline [km] per 1000 sq km	Area [sq km] per Airport	Railway [km] per 1 mill pop.	Highway [km] per 1 mill pop.	Inl. Water- way [km] per 1 mill pop.	Pipeline [km] per 1 mill pop.	Pop. [1000] per Airport
Europe										
ALBANIA	18,89	641,74	1,50	9,18	2.614	159	5.404	13	77	310
AUSTRIA	67,07	1.311,87	5,32	39,79	1.525	704	13.773	56	418	145
BELARUS	26,83	473,03	-	21,92	1.759	534	9.408	-	436	88
BELGIUM	111,77	4.520,22	66,96	151,69	710	338	13.679	203	459	234
BOSNIA/HERZEGOVINA	19,93	413,17	-	5,15	1.898	319	6.611	-	82	119
BULGARIA	38,72	332,99	4,24	19,10	312	489	4.209	54	241	25
CROATIA	47,74	484,06	13,88	17,69	744	578	5.866	168	214	61
CZECH REPUBLIC	119,87	710,14	-	68,61	678	904	5.357	-	518	90
DENMARK	65,89	1.649,45	9,68	32,23	365	546	13.663	80	267	44
ESTONIA	22,84	671,84	11,09	9,31	2.050	634	18.642	308	258	74
FINLAND	17,40	227,74	19,81	1,72	2.120	1.153	15.094	1.313	114	32
FRANCE	62,29	2.762,55	27,30	59,03	1.149	586	26.006	257	556	122
GERMANY	121,76	1.782,75	21,13	294,62	541	534	7.823	93	1.293	123
GREECE	18,97	985,30	3,07	4,34	1.670	235	12.209	38	54	135
HUNGARY	83,68	1.706,02	17,44	60,10	1.193	754	15.381	157	542	132
IRELAND	27,70	1.313,70	-	3,20	1.597	548	26.004	-	63	81
ITALY	64,74	1.013,80	7,97	77,19	2.183	335	5.242	41	399	422
LATVIA	37,44	928,24	4,68	32,61	1.282	869	21.535	109	756	55
LITHUANIA	30,83	677,91	9,20	13,27	679	519	11.402	155	223	40
MACEDONIA	36,40	418,07	-	-	1.583	427	4.904	-	-	135
MOLDOVA	34,12	593,47	-	9,20	1.296	256	4.455	-	69	173
NETHERLANDS	73,85	2.808,22	-	311,09	1.287	178	6.784	410	752	533
NORWAY	12,42	274,26	4,86	0,16	3.118	930	20.532	364	12	42
POLAND	81,64	1.173,72	12,78	22,21	2.333	658	9.461	103	179	289
PORTUGAL	33,32	762,12	8,91	0,87	1.417	290	6.644	78	8	162
ROMANIA	47,85	1.944,76	7,26	44,75	1.522	490	19.910	74	458	149
SERBIA/MONTENEGRO	38,69	449,62	-	25,94	1.895	357	4.145	-	239	206
SLOVAKIA	74,93	361,35	-	55,28	1.320	674	3.249	-	497	147
SLOVENIA	59,17	725,56	-	29,32	1.450	585	7.178	-	290	147
SPAIN	28,53	657,67	2,07	7,38	4.762	365	8.424	27	95	372
SWEDEN	26,67	301,93	4,56	0,19	1.779	1.360	15.400	233	10	35
SWITZERLAND	139,57	1.722,40	1,57	44,08	598	813	10.038	9	257	103
UKRAINE	38,68	453,37	2,77	19,43	855	450	5.277	32	226	73
UNITED KINGDOM	68,98	1.470,66	9,36	68,32	485	290	6.176	39	287	115

	Railway [km] per 1000 sq km	Highway [km] per 1000 sq km	Int. Water- way [km] per 1000 sq km	Pipeline [km] per 1000 sq km	Area [sq km] per Airport	Railway [km] per 1 mill pop.	Highway [km] per 1 mill pop.	Int. Water- way [km] per 1 mill pop.	Pipeline [km] per 1 mill pop.	Pop. [1000] per Airport
Asia										
AFGHANISTAN	0,04	32,43	1,85	0,28	13.490	1	988	56	8	443
ARMENIA	28,19	379,19	-	30,20	2.709	236	3.177	-	253	323
AZERBAIJAN	24,13	423,79	-	34,64	1.255	268	4.711	-	385	113
BANGLADESH	20,08	50,28	35,76	8,47	9.000	23	57	40	10	8.006
BHUTAN * See footnote	-	46,06	-	-	23.500	-	1.216	-	-	890
CAMBODIA	3,62	188,36	20,44	-	8.229	62	3.229	350	-	480
CHINA, P. REP. OF	6,85	107,22	11,44	1,77	47.044	55	855	91	14	5.898
GEORGIA	22,53	486,37	-	15,93	2.489	274	5.920	-	194	204
INDIA	18,92	599,22	4,92	1,86	9.340	66	2.103	17	7	2.661
INDONESIA	3,63	62,26	11,24	2,43	4.265	34	587	106	23	452
IRAN	2,94	85,07	0,55	8,71	6.314	75	2.169	14	222	248
IRAQ	5,62	104,22	2,32	14,72	3.612	119	2.206	49	312	171
ISRAEL	24,61	637,06	-	51,44	364	96	2.478	-	200	94
JAPAN	72,33	2.943,01	4,68	5,84	2.159	218	8.860	14	18	717
JORDAN	8,84	84,07	-	2,34	5.248	192	1.829	-	51	241
KAZAKHSTAN	5,32	69,55	-	2,88	7.720	832	10.877	-	451	49
KUWAIT	-	239,62	-	60,72	2.228	-	2.350	-	595	227
KYRGYZSTAN	1,86	152,64	-	1,01	3.676	78	6.352	-	42	88
LAOS	-	59,67	31,60	0,57	4.554	-	2.921	1.547	28	93
LEBANON	21,35	701,92	-	6,92	1.156	60	1.975	-	19	411
MALAYSIA	5,46	88,03	22,13	5,11	2.867	91	1.472	370	85	172
MONGOLIA	1,12	29,84	0,25	-	46.029	702	18.728	159	-	73
MYANMAR	5,88	39,79	18,87	2,47	8.481	88	599	284	37	564
NEPAL	0,72	52,56	-	-	3.200	5	343	-	-	490
NORTH KOREA	40,77	248,88	18,69	0,31	2.460	209	1.277	96	2	479
OMAN	-	122,38	-	10,97	1.518	-	12.235	-	1.096	15
PAKISTAN	10,91	220,68	-	6,44	6.756	67	1.349	-	39	1.105
PHILIPPINES	2,67	535,67	10,73	1,19	1.115	11	2.193	44	5	272
RUSSIA	9,02	54,70	5,92	11,89	6.784	1.027	6.230	674	1.354	60
SAUDI ARABIA	0,71	77,29	-	4,46	9.292	130	14.123	-	816	51
SOUTH KOREA	68,67	641,75	16,34	4,62	864	148	1.387	35	10	400
SRI LANKA	29,69	1.147,13	6,55	0,94	4.686	106	4.103	23	3	1.310
SYRIA	10,79	170,48	4,70	9,82	1.731	129	2.043	56	118	144
TAIWAN	127,85	557,00	-	19,79	878	214	932	-	33	524
TAJKISTAN	3,35	208,94	-	2,80	2.425	78	4.857	-	65	104
THAILAND	7,67	151,16	7,78	0,81	4.895	65	1.289	66	7	574
TURKEY	13,34	410,73	1,54	6,11	6.729	164	5.057	19	75	547
TURKMENISTAN	4,34	47,12	-	9,53	7.627	520	5.644	-	1.141	64
UN. ARAB EMIRATES	-	26,46	-	22,49	1.843	-	684	-	581	71
UZBEKISTAN	7,73	175,23	-	2,46	1.714	150	3.396	-	48	88
VIETNAM	9,28	257,92	53,71	0,46	6.866	41	1.143	238	2	1.550
YEMEN	-	97,34	-	1,28	11.478	-	3.489	-	46	320

	Railway [km] per 1000 sq km	Highway [km] per 1000 sq km	Inl. Water- way [km] per 1000 sq km	Pipeline [km] per 1000 sq km	Area [sq km] per Airport	Railway [km] per 1 mill pop.	Highway [km] per 1 mill pop.	Inl. Water- way [km] per 1 mill pop.	Pipeline [km] per 1 mill pop.	Pop. [1000] per Airport
Africa										
ALGERIA	1,99	40,13	-	4,14	17.135	166	3.349	-	345	205
ANGOLA	2,56	59,22	1,04	0,14	4.314	317	7.332	129	18	35
BENIN	5,13	74,87	-	-	16.089	105	1.527	-	-	789
BOTSWANA	1,48	19,18	-	-	6.004	638	8.269	-	-	14
BURKINA	2,26	60,18	-	-	5.713	59	1.583	-	-	217
BURUNDI	-	212,00	-	-	6.958	-	942	-	-	1.566
CAMEROON	2,34	136,72	4,40	-	7.924	82	4.807	155	-	225
CENTR. AFRICAN REP.	-	35,31	1,28	-	10.213	-	6.854	249	-	53
CHAD	-	24,39	1,56	-	19.455	-	5.607	358	-	85
CONGO, THE	2,33	34,97	3,27	0,07	8.341	318	4.774	447	10	61
COTE D'IVOIRE	2,05	144,51	3,04	-	8.062	45	3.151	66	-	370
EGYPT	4,89	47,32	3,49	2,22	11.005	78	760	56	36	685
ERITREA	2,53	31,69	-	-	6.066	86	1.074	-	-	179
ETHIOPIA	0,60	21,41	-	-	11.501	12	431	-	-	571
GABON	2,42	28,02	5,98	1,06	3.879	562	6.489	1.384	246	17
GHANA	4,00	135,20	5,42	-	19.878	54	1.816	73	-	1.480
GUINEA	4,26	122,43	5,27	-	16.391	160	4.596	198	-	437
GUINEA-BISSAU	-	89,09	-	-	1.129	-	2.862	-	-	35
KENYA	4,55	110,77	-	0,83	2.368	92	2.240	-	17	117
LESOTHO	0,09	237,73	-	-	1.047	1	3.620	-	-	69
LIBERIA	4,40	90,57	-	-	1.888	159	3.282	-	-	52
LIBYA	-	10,97	-	3,85	12.052	-	3.677	-	1.290	36
MADAGASCAR	1,74	68,14	-	-	4.254	74	2.886	-	-	100
MALAWI	6,66	110,86	1,22	-	2.521	80	1.339	15	-	209
MALI	0,52	12,66	1,46	-	37.576	68	1.675	194	-	284
MAURITANIA	0,67	7,30	-	-	36.811	305	3.325	-	-	81
MOROCCO	4,24	133,19	-	2,45	6.034	65	2.039	-	38	394
MOZAMBIQUE	4,10	33,06	4,68	0,74	4.175	182	1.463	207	33	94
NAMIBIA	2,84	66,03	-	-	6.114	1.417	32.999	-	-	12
NIGER	-	31,55	0,24	-	43.690	-	4.307	32	-	320
NIGERIA	3,86	116,90	9,28	6,00	11.547	35	1.067	85	55	1.265
RWANDA	-	185,46	-	-	3.763	-	568	-	-	1.229
SENEGAL	4,61	71,40	4,57	-	8.175	100	1.555	100	-	375
SIERRA LEONE	1,17	103,15	11,15	-	6.522	18	1.557	168	-	432
SOMALIA	-	35,29	-	0,02	8.390	-	3.062	-	2	97
SOUTH AFRICA	16,92	154,36	-	2,46	1.430	458	4.176	-	67	53
SUDAN	2,20	8,26	2,12	0,33	35.797	183	687	176	27	430
SWAZILAND	17,11	164,34	-	-	964	307	2.950	-	-	54
TANZANIA	2,75	86,66	-	1,04	8.751	91	2.854	-	34	266
TOGO	9,37	113,79	0,88	-	6.310	121	1.465	11	-	490
TUNISIA	13,81	178,37	-	9,93	5.278	255	3.286	-	183	286
UGANDA	5,51	111,00	-	-	8.139	66	1.339	-	-	675
ZAIRE	2,19	62,46	6,40	0,17	8.687	117	3.325	340	9	163
ZAMBIA	1,69	48,33	2,99	2,29	6.660	135	3.850	238	183	84
ZIMBABWE	7,03	218,23	-	0,54	829	246	7.651	-	19	24

Figure 1: Network length (railway, road, waterway, pipeline) per area of selected countries. Source of data: [1], own edition.

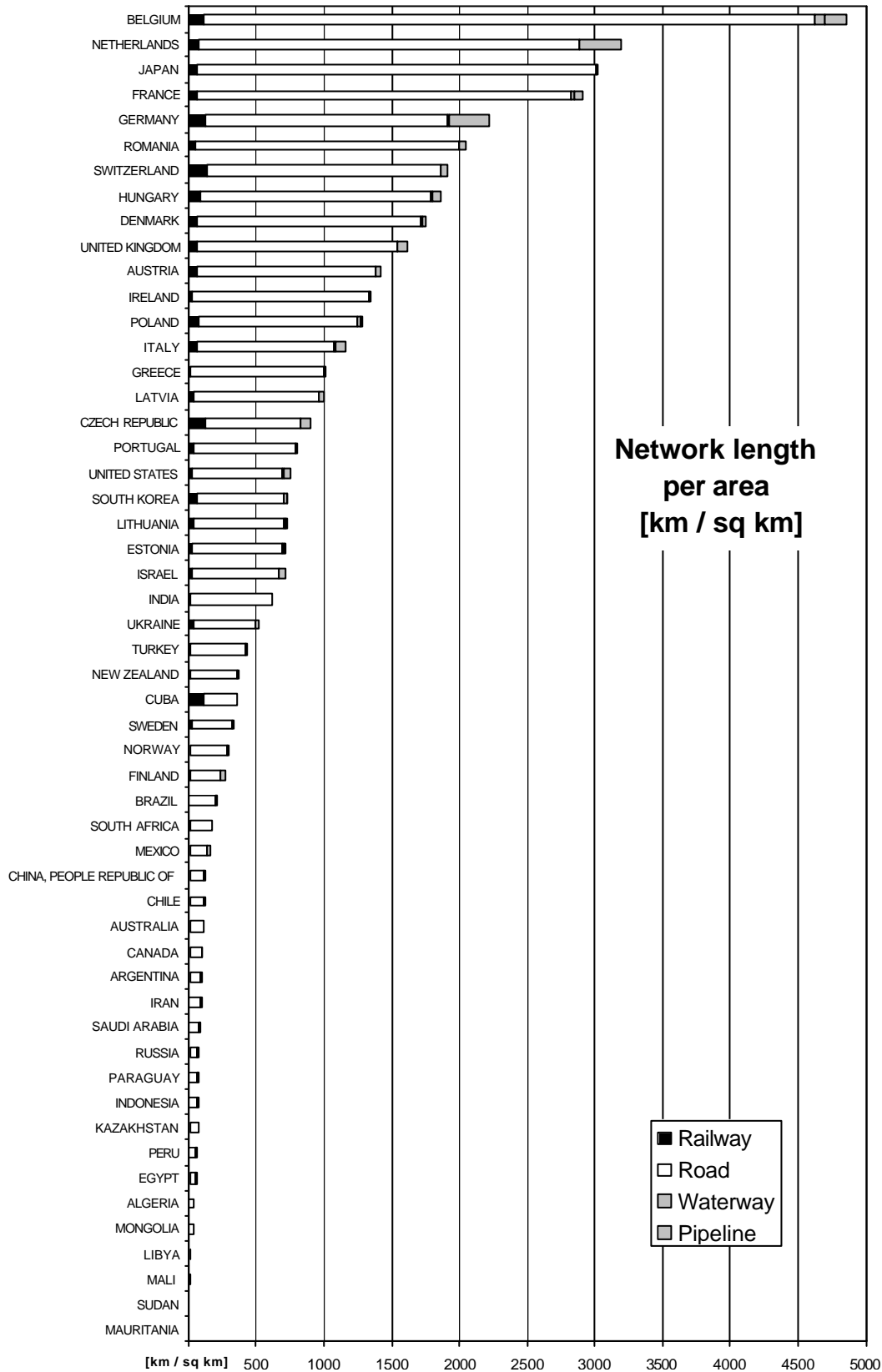


Figure 2: Network length (railway, road, waterway, pipeline) per population of selected countries. Source of data: [1], own edition.

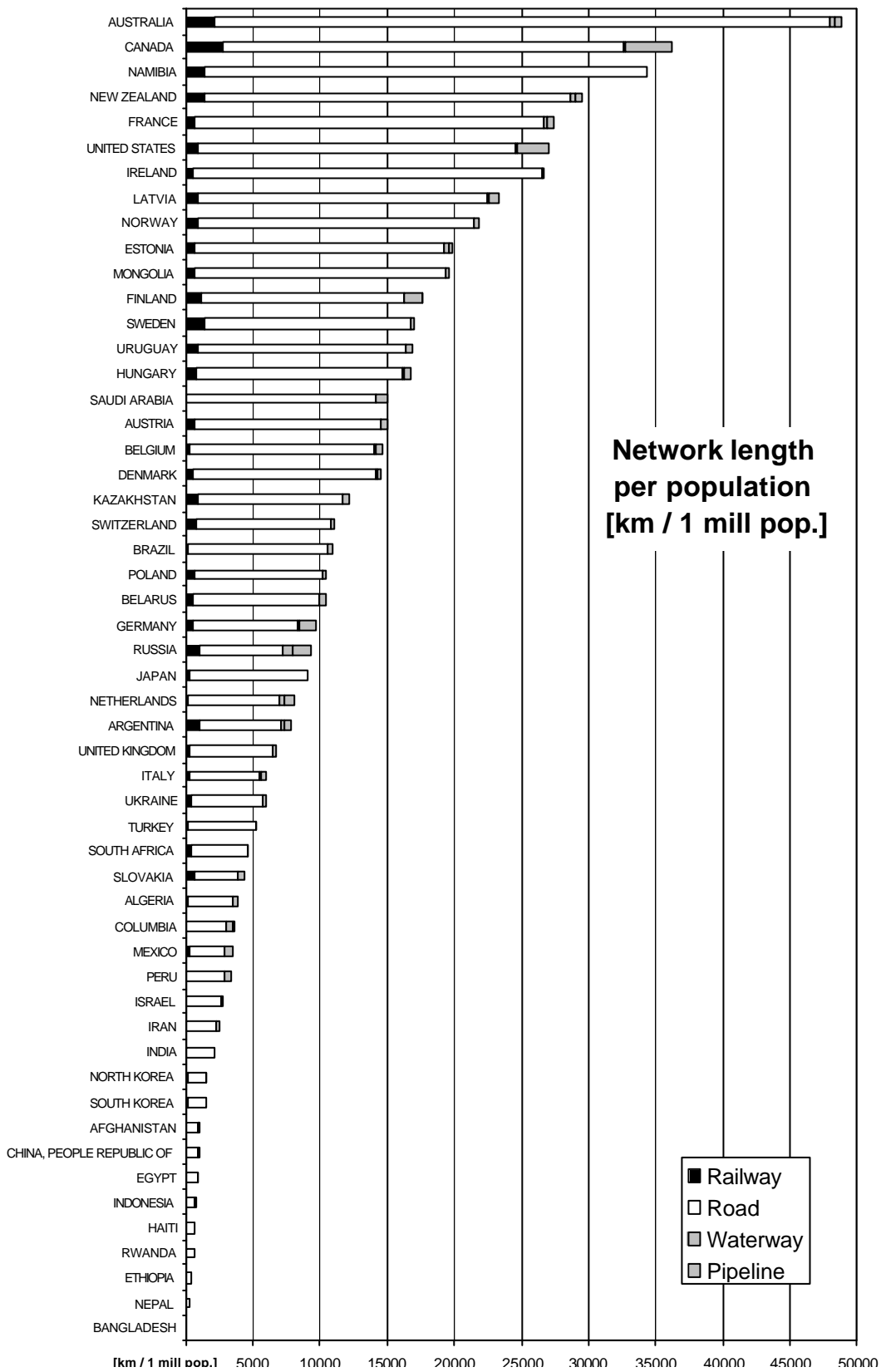


Figure 3: Area [sqkm] per Airport. Source of data: [1], own edition.

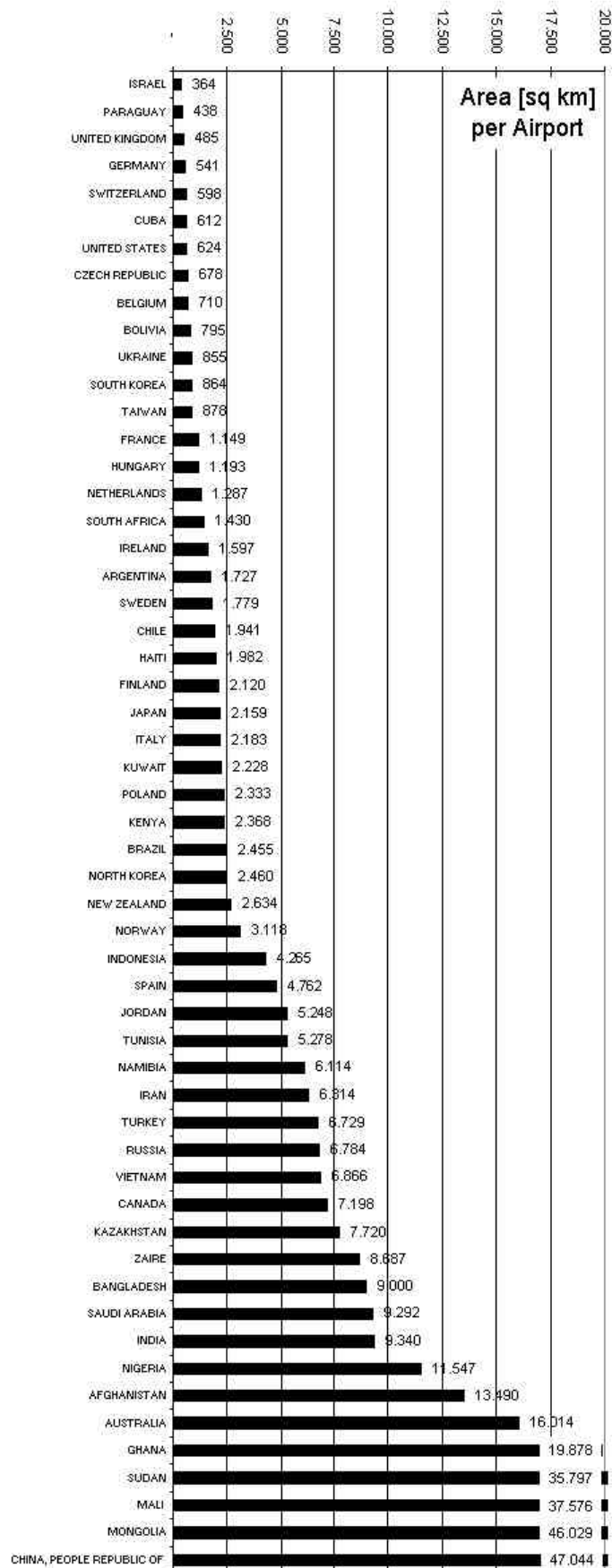
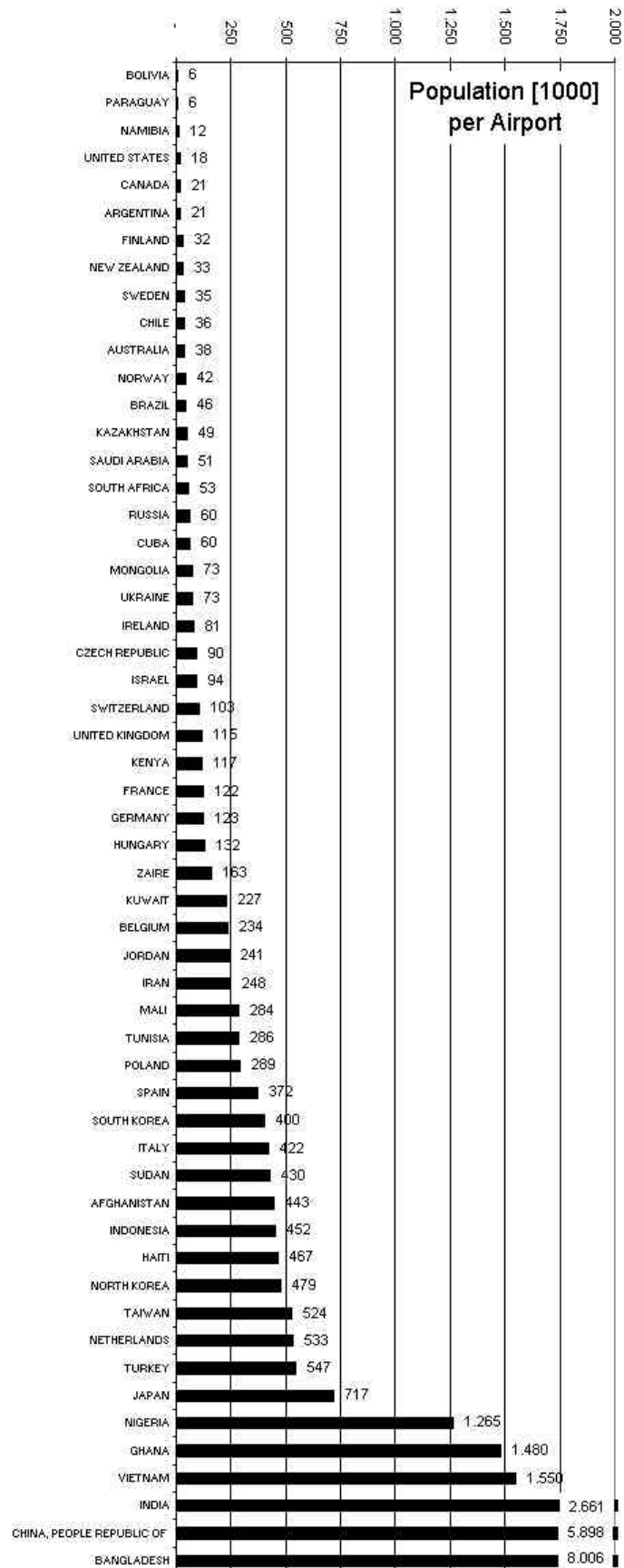


Figure 4: Population per Airport. Source of data: [1], own edition.

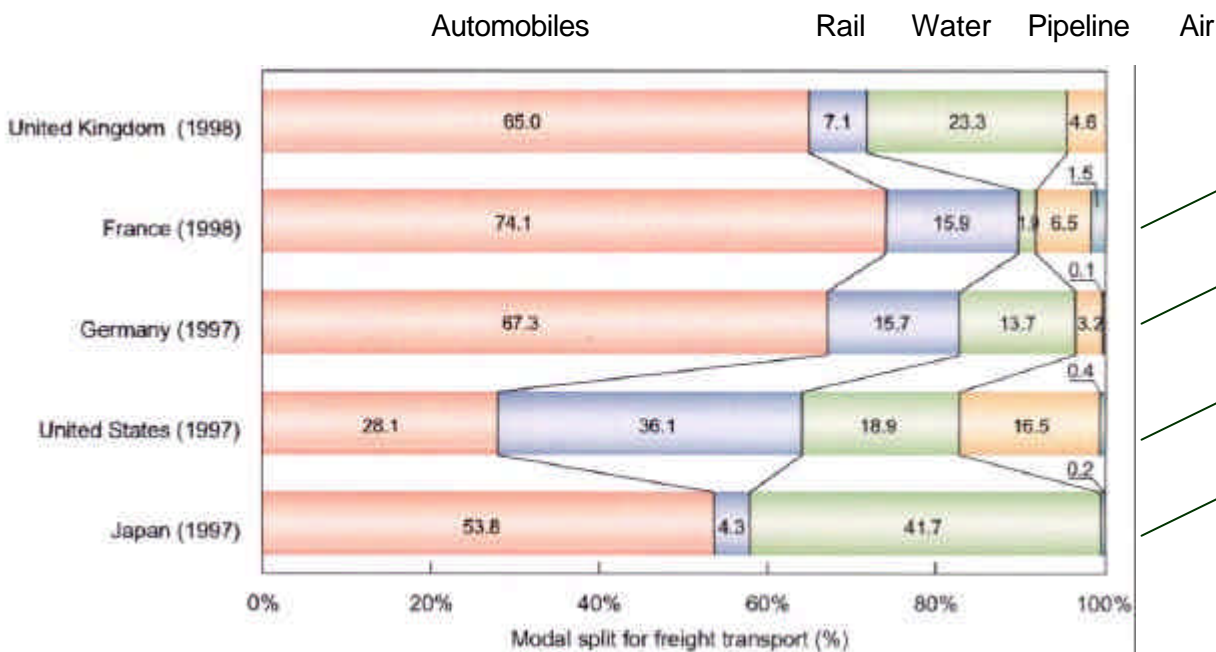


3.2 Freight Transport

Characteristic data for description of the freight transport system are the transport volume (unit: tons) and the transport performance (unit: ton-kilometres).

Figure 4 contains the modal split in freight transport (ton-kilometres) of selected countries. **Figure 5** shows the same topic in change by time. The collected data are listed in **table 3** below. For selected countries **Figure 6** shows a comparison of modal split in transport volume and transport performance if available and some more data of special interest.

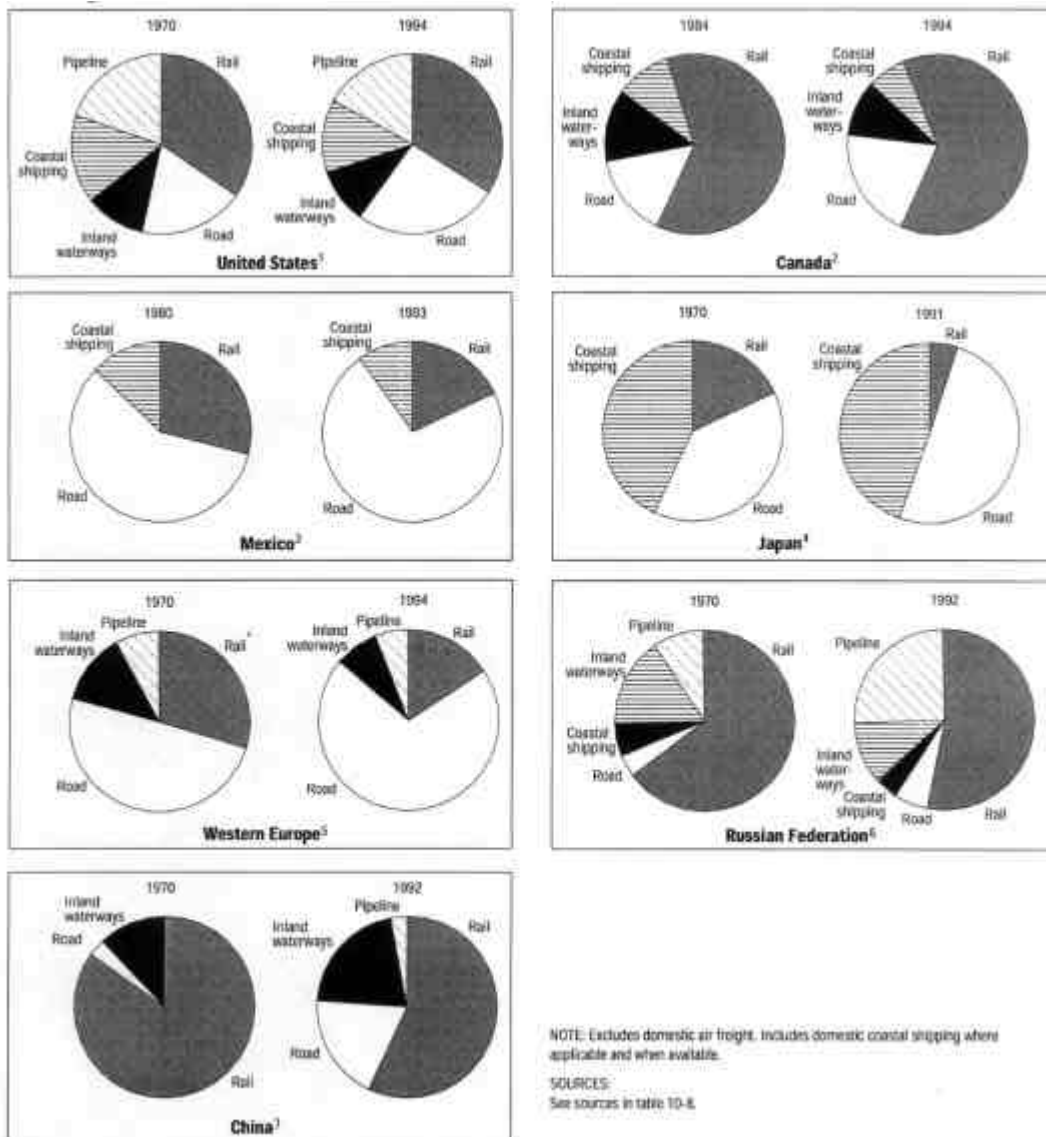
Figure 4: Modal split for freight transport in selected countries. Source: [24]



Note: Japan has not a category of pipeline.
 As to France, only figures of airlines are those of 1997

Source: Road Administration, Road Bureau, Ministry of Construction, 1999
 National Transportation Statistic 1999, USDOT
 Verkehr in Zahlen 1999, BMV
 LES TRANSPORTS EN 1998, Institut national de la statistique et des
 etudes economiques Memento de Statistiques des Transport 1997.
 Ministere de l'Equipement, des Transports et du logement
 Transports Statistic Great Britain 1999 (25th EDITION), DETR., 1999

Figure 5: Domestic Freight Activity by Mode in Selected Countries and Regions.
 Source: [2].



1 Class I railroads only. Rail figures are based on revenue metric ton-kilometers. Data are for intercity truck metric ton-kilometers only, and therefore are underrepresented.

2 Data for 1970 were unavailable. Class I and Class II railroads only.

Data are for for-hire Class I and Class II road carriers only, and therefore are underrepresented. The classification of Class I and Class II truck carriers changed between 1984 and 1994. In 1987, Class I and Class II establishments were those with gross operating revenues of CAD\$ 350,000 and greater. From 1988 to 1989, Class I and Class II establishments were those with gross operating revenues of CAD\$ 500,000 and greater. From 1990 to 1994 Class I and Class II establishments were those with gross operating revenues of CAD\$ 1 million and greater. Because of these definitional changes, the level of domestic road activity in Canada may be underestimated.

3 Data for 1970 and 1994 were not available.

4 Data for 1944 were not available.

5 Includes Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom. Data for 1994 for road, inland waterways, and total domestic freight are Economic Conference of Ministers of Transport estimates. Data for Belgium, Ireland and Greece for 1994 were not available; 1991 data were used for these countries, and included in the 1994 totals for Western Europe. Data for the Netherlands, Portugal, and Sweden for 1994 were not available; 1993 data were used for these Countries, and included in the 1994 Western European totals. German data for 1970 included in the 1970 Western European totals were only for the former Federal Republic of Germany and West Berlin. German data for 1994 were not available; 1993 data were used in the Western European 1994 totals. German data for 1993 includes both the former East and West Germany.

Roads totals for 1970 do not include Ireland or Portugal.

Inland waterway totals for 1970 and 1994 do not include Denmark, Greece, Ireland, Norway, Portugal, Spain and Sweden due to inapplicability or unavailability of data.

Totals for 1970 and 1994 do not include Finland, Greece, Ireland, Luxembourg, Portugal and Sweden due to inapplicability or unavailability of data. Data for Denmark were not included in 1970 Western European totals, but were included in 1994 totals

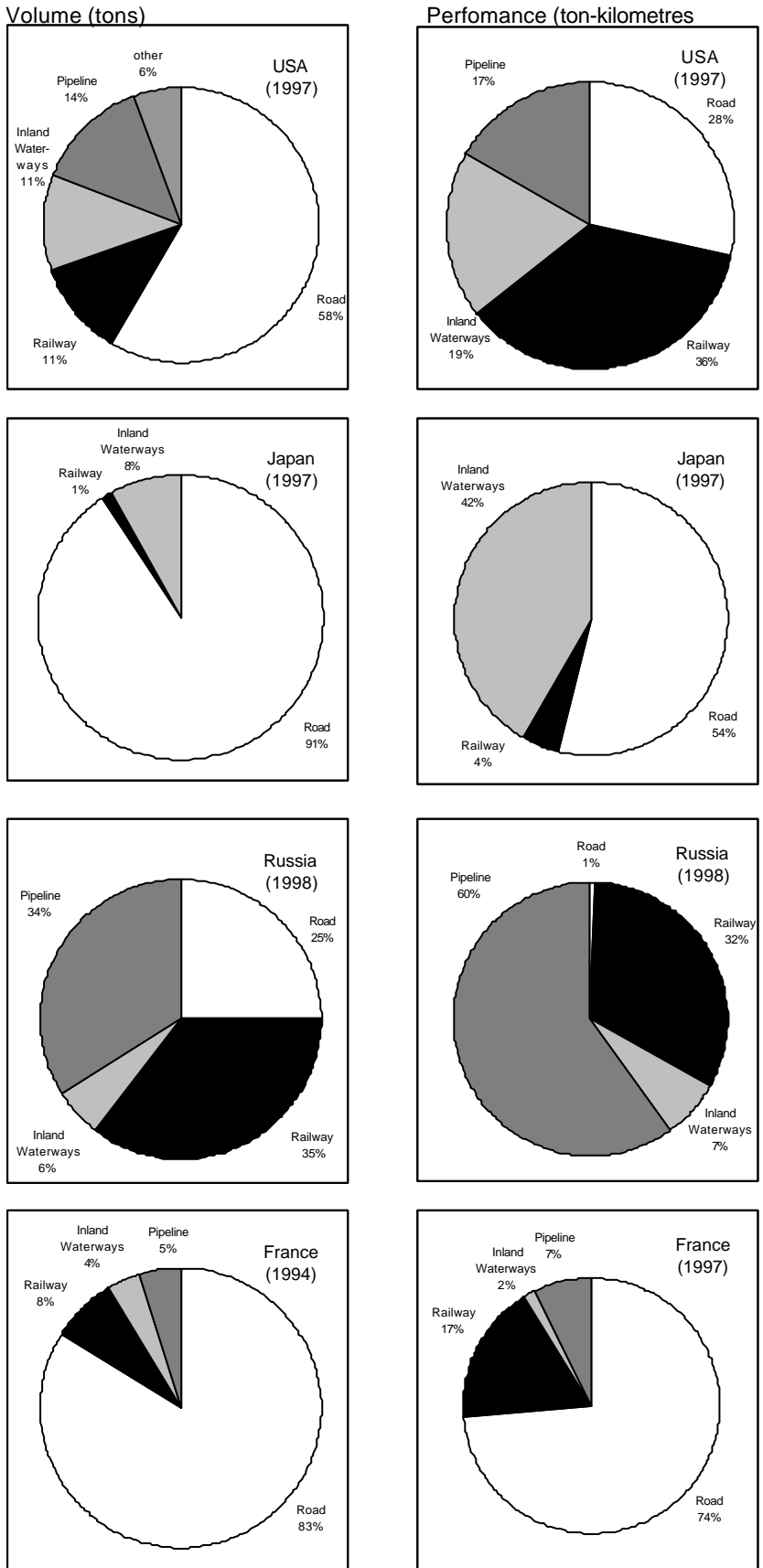
Table 3: Freight Transport in Volume and Performance in selected countries.
Sources as given below.

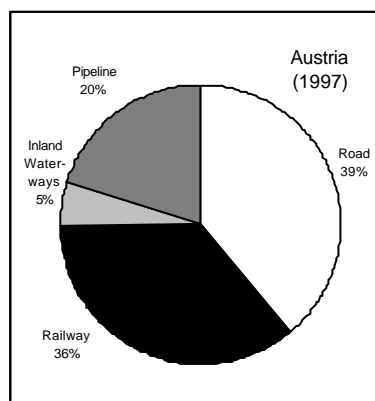
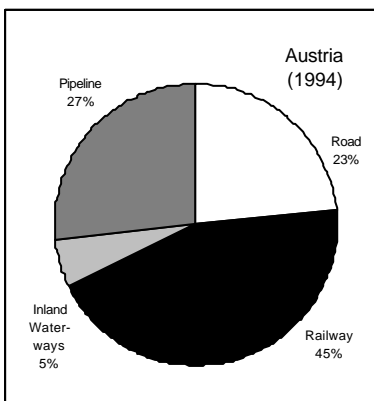
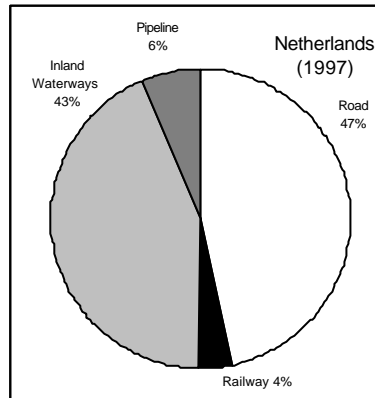
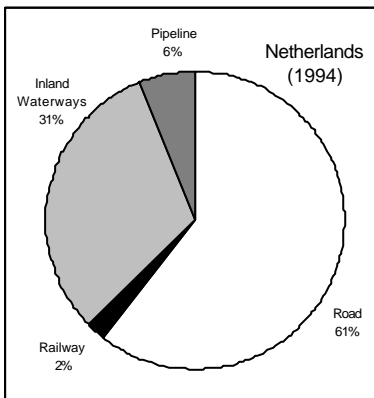
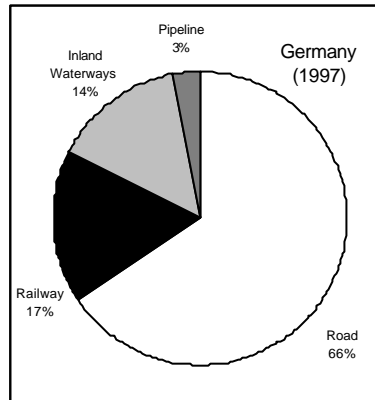
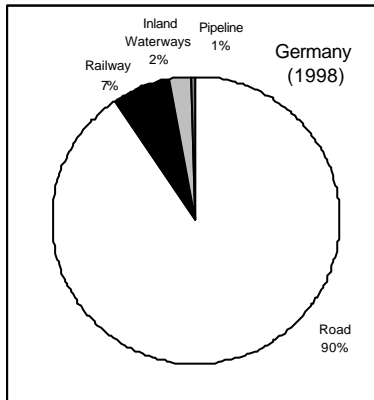
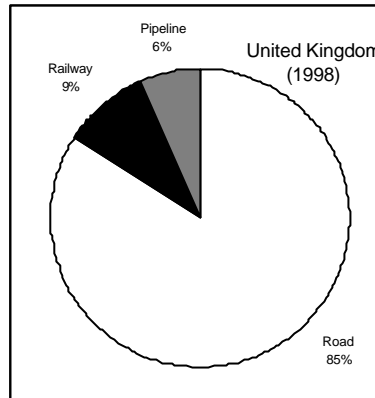
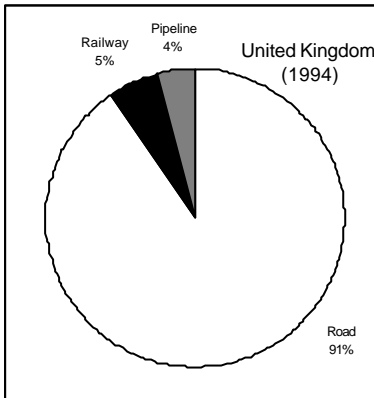
Freight Transport - Volume									
Country	Year	Unit	Road	Railway	Inland Waterways	Pipeline	Air	Source	Remarks
Austria	1994	1000 t	32600	62500	7700	37400		[5]	
Belgium	1994	1000 t	390600	63400	90000	27000		[5]	
Czech Republic	1998	1000 t	62933	93531	1678		130	[8]	
Danmark	1994	1000 t	191000	9000	0	10000		[5]	
Germany	1998	1000 t	2880700	211400	63900	22000	80	[7]	pipeline: oil only
Finnland	1995	1000 t	404800	39400	2000	0		[5]	
France	1994	1000 t	1349900	123900	62500	74000		[5]	
Greece	1993	1000 t	175000	3300	0	0		[5]	
Ireland	1993	1000 t	87000	3000	0	0		[5]	
Italy	1994	1000 t	958400	67000	600	98500		[5]	
Japan	1997	1000 t	6065000	69000	541000		1000	[15]	
Kazakhstan	1999	1000 t	361000	124100	100	98000	20	[17]	
Netherlands	1994	1000 t	476300	17800	245000	47500		[5]	
Portugal	1994	1000 t	285100	7100	0	0		[5]	
Russia	1998	1000 t	584000	834000	129000	790000	600	[22]	
Slovakia	1998	1000 t	34178	56014	1370		1	[20]	
Spain	1994	1000 t	614300	20800	0	24200		[5]	
United Kingdom	1994	1000 t	1654400	97300	0	74400		[5]	
Indonesia	1998	1000 t		18129	11254		311.6	[12]	
Israel	1998	1000 t		9155	1591		280	[18]	
Argentina	1996	1000 t		18912			170	[19]	
Sweden	1994	1000 t		54000	0	0		[5]	
USA	1997	%	58.3	11.2	11.1	13.7	0	[14]	0.2% postal, 5.5% unknown

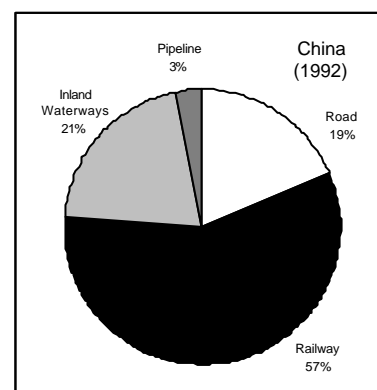
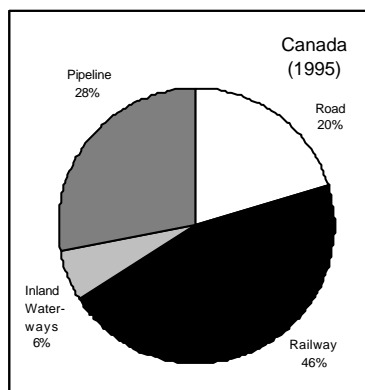
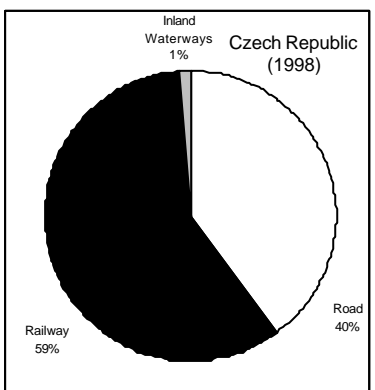
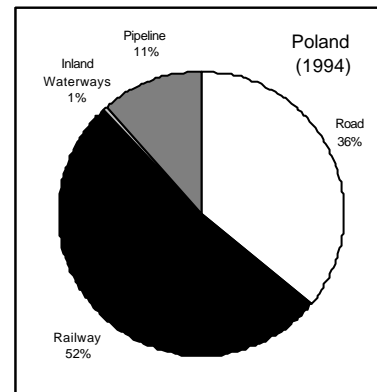
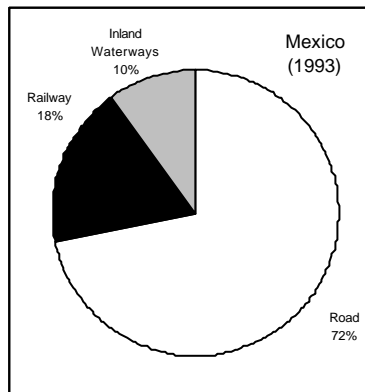
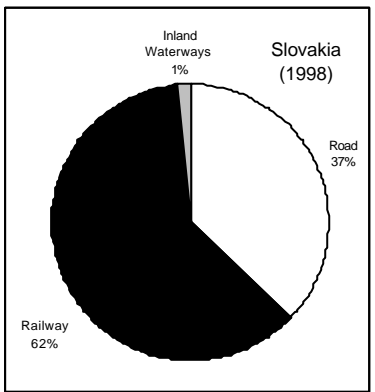
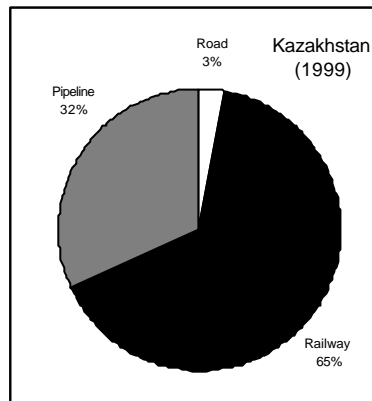
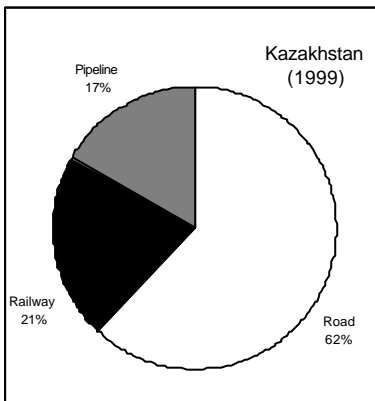
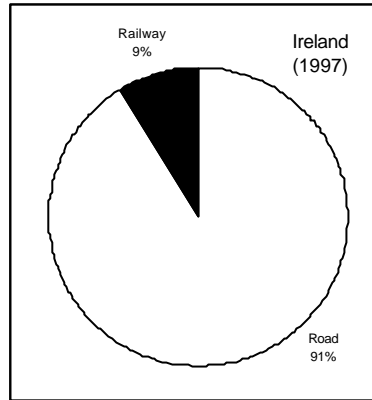
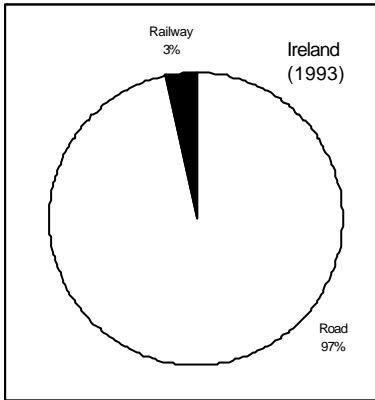
Freight Transport - Performance									
Country	Year	Unit	Road	Railway	Inland Waterways	Pipeline	Air	Source	Remarks
Austria	1997	mill t km	15500	14195	2100	8000		[16]	pipeline: oil only
Belgium	1997	mill t km	34900	7465	6120	1500		[16]	pipeline: oil only
Canada	1995	mill t km	110011	248337	34000	150000		[16]	pipeline: oil only
China	1992	mill t km	375600	1157600	422200	61700		[2]	
Denmark	1997	mill t km	14500	1619	0	3800		[16]	pipeline: oil only
Finnland	1997	mill t km	24100	9856	500	0		[16]	pipeline: oil only
France	1997	mill t km	229200	53855	5970	22100		[16]	pipeline: oil only
Germany	1997	mill t km	280700	72700	62150	13200		[16]	pipeline: oil only
Ireland	1997	mill t km	5500	522	0	0		[16]	pipeline: oil only
Italy	1997	mill t km	198300	23000	200	13200		[16]	pipeline: oil only
Japan	1997	mill t km	306000	25000	237000		1000	[15]	
Kazakhstan	1999	mill t km	1612	39855	16.3	19140	23	[17]	
Mexico	1993	mill t km	139700	35700	19400			[2]	
Netherlands	1997	mill t km	43900	3400	41020	6000		[16]	pipeline: oil only
Poland	1994	mill t km	45400	65800	800	14300		[2]	
Portugal	1997	mill t km	13200	2247	0	0		[16]	pipeline: oil only
Russia	1998	mill t km	21000	1020000	215000	1888000	2000	[22]	
Spain	1997	mill t km	92500	11490	0	6500		[16]	pipeline: oil only
Sweden	1997	mill t km	31200	14182	0	0		[16]	pipeline: oil only
United Kingdom	1997	mill t km	150200	16949	200	11200		[16]	pipeline: oil only
USA	1997	mill t km	1691059	2170442	1138223	992753	21884	[14]	
Hungary	1999	mill t km	13135	7733				[23]	share road/railway only
Switzerland	1997	mill t km	14236	8688				[21]	share road/railway only

Note: inland waterways contain coastal shipping and ferry transport
For sources see Chapter 4

Figure 6: Modal split of freight transport in volume and performance.
 Sources as given in table 3.





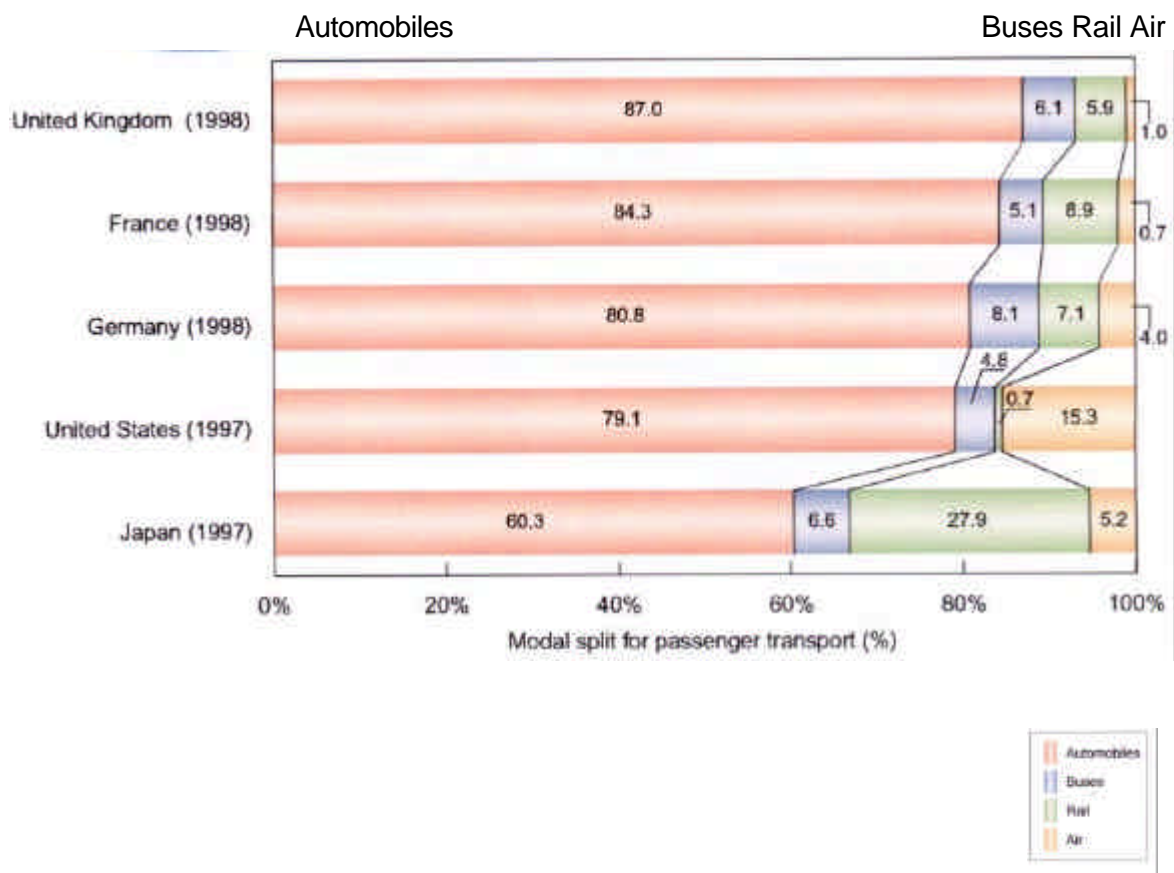


3.3 Passenger Transport

Characteristic data for description of the passenger transport system are the transport volume (unit: number of passengers) and the transport performance (unit: passenger-kilometres).

Figure 7 and 8 contain the modal split in passenger transport (passenger-kilometres) of selected countries. The collected data are listed in **table 4** For selected countries **Figure 9** shows a comparison of modal split in transport volume and performance.

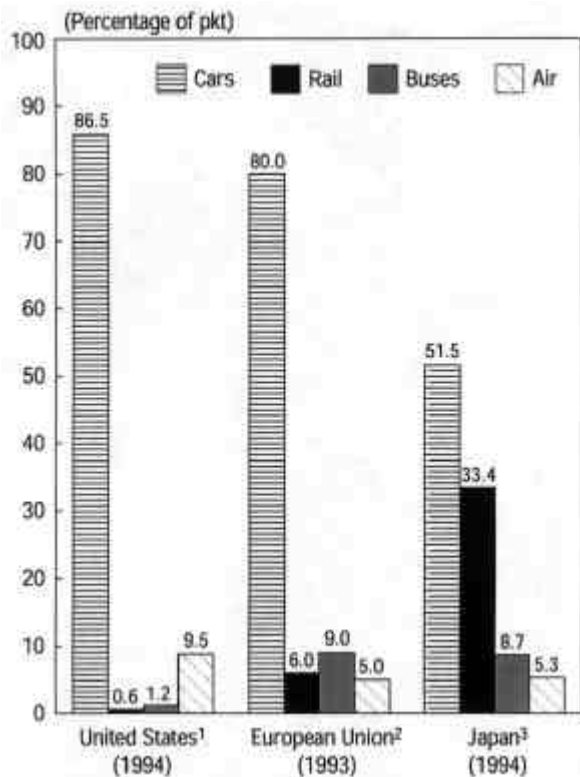
Figure 7: Modal split for passenger transport in selected countries. Source: [24]



Note: For Japan, water transportation (5,4 billion man-km) is excluded.
 For Germany, figures of the buses include streetcars.

Source:Verkehr in Zahlen 1999, BMV
 Road Administration, Road Bureau, Ministry of Construction, 1999
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Figure 8: Modal shares of passenger transport. Source: [2]



¹ United States. Car total includes data for passengers cars, taxis and light trucks. Rail total includes light rail, heavy rail, commuter and intercity rail. Bus total includes data for transit motor buses and intercity buses. Air total includes data for certificated air carriers, domestic carriers and general aviation.

² European Union. Car total includes data for private cars. Rail total includes data for intercity and commuter rail and light rail (where available). Bus total includes local buses and intercity coaches. Air total includes domestic carriers.

³ Japan. Car total includes data for private and commercial passenger cars. Rail total includes Japan railways and private rail. Bus total includes buses for private and commercial use. Air total includes general aviation and domestic carriers.

KEY: pkt = passenger-kilometers traveled.

SOURCES:

For United States: U.S. Department of Transportation, Bureau of Transportation Statistics. 1996. National Transportation Statistic 1997. Washington, DC. December.

For Europe: European Commission. 1995. The Trans-European Transport Network. Transforming a Patchwork into a Network. Brussels, Belgium. Statistic Handbook 1995. Tokyo. 15 February.

Table 4: Passenger Transport in Volume and Performance in selected countries.

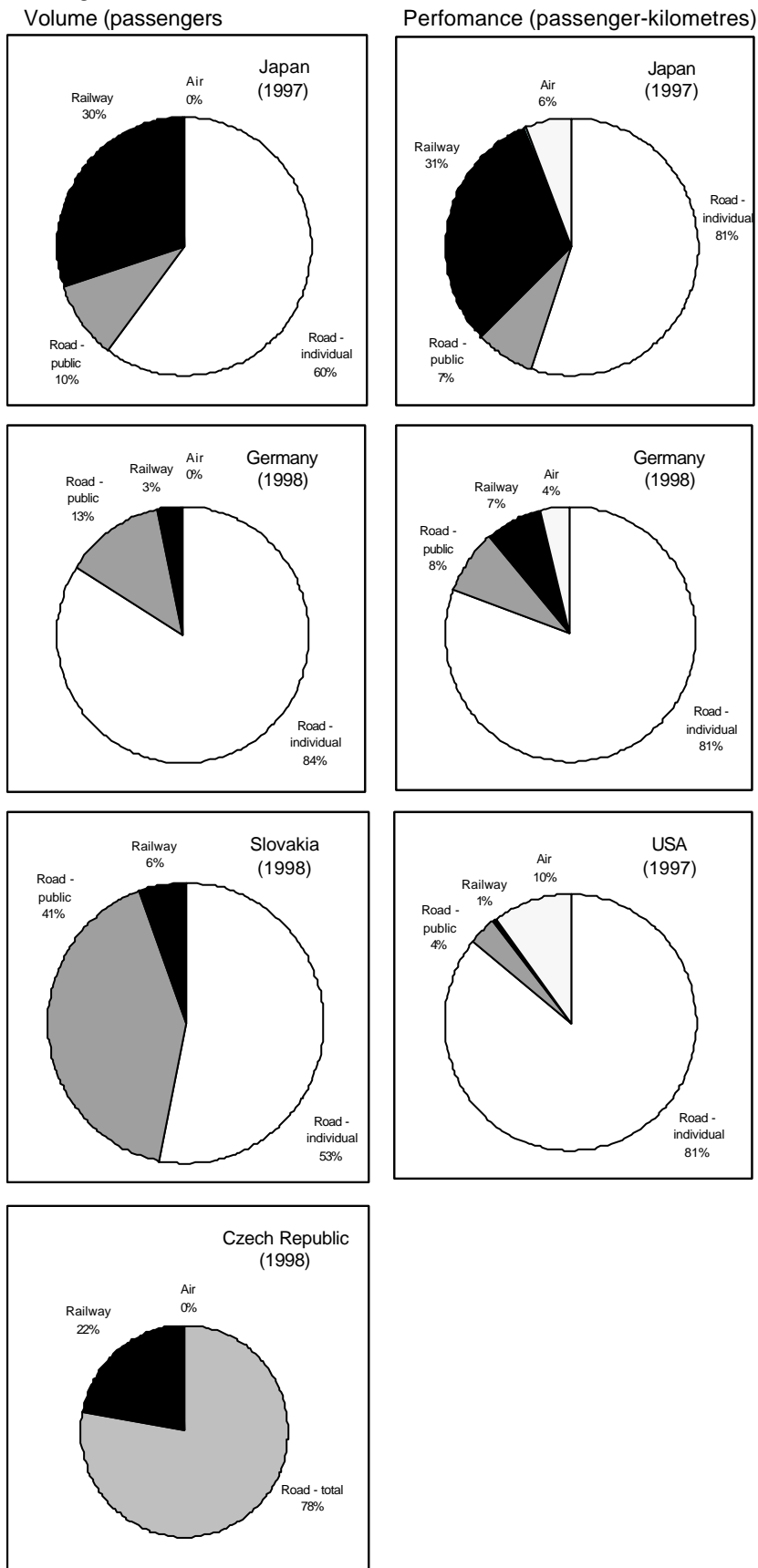
Sources as given below.

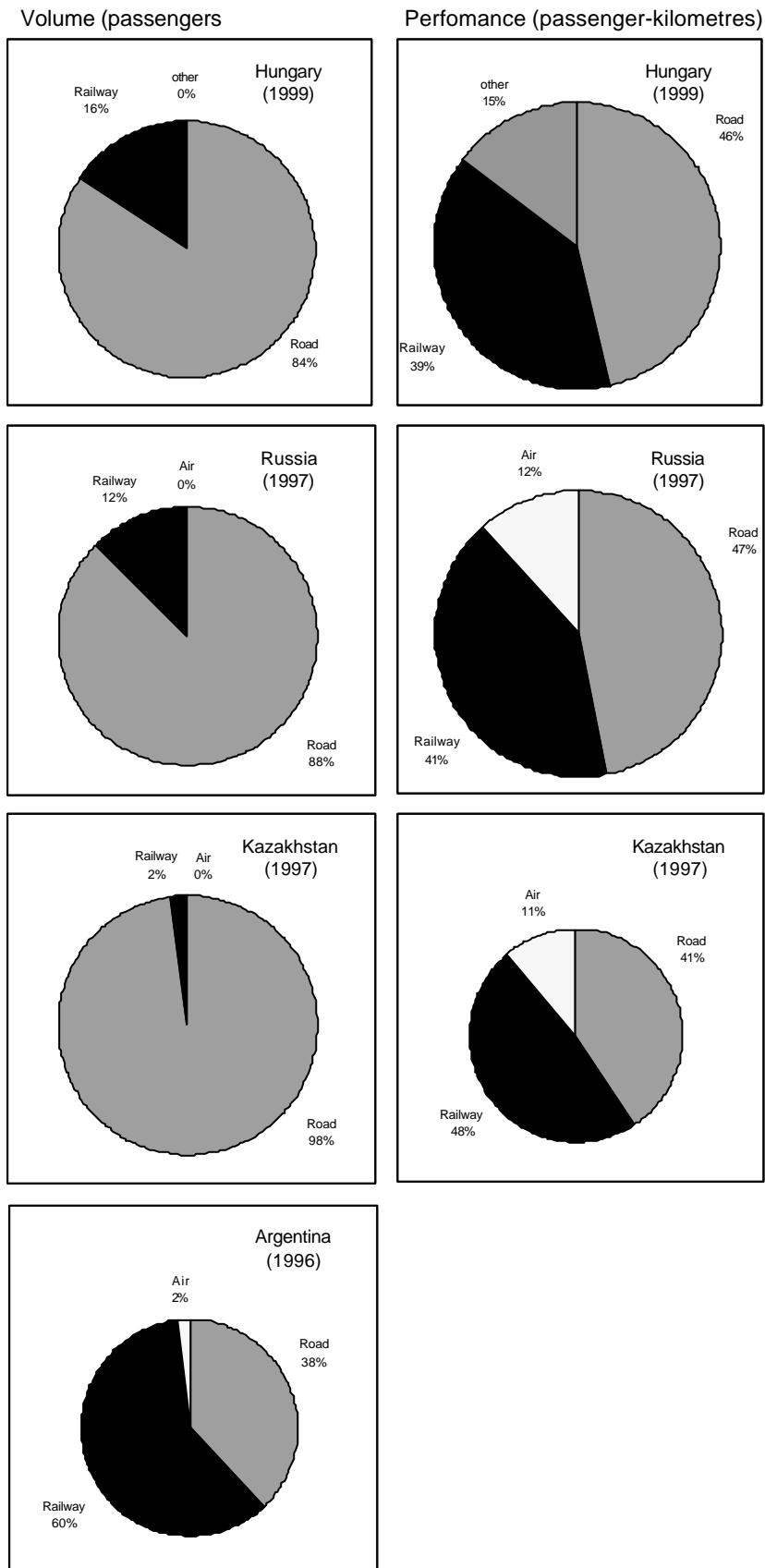
Passenger Transport - Volume									
Country	Year	Unit	Road (individual)	Road (public)	Railway	Inland Waterways	Air	Source	Remarks
Japan	1997	1000	45117000	7351000	2.2E+07	145000	86000	[15]	
Germany	1998	1000	50876000	7762000	1908900		104000	[7]	
Slovakia	1998	1000	657775	510915	69842	90	138	[20]	
Czech Republi	1998	1000	652200		182000		2400	[8]	
Russia	1998	1000		3.9E+07	5617000	18300	23000	[22]	public transport only, railway including
Kazakhstan	1999	1000		398000	8500	20	300	[17]	public transport only
Hungary	1999	1000		2057600	380300		500	[23]	public transport only
Argentina	1996	1000		289000	458749		12669	[19]	public transport only
Israel	1998	1000			6382		7873	[18]	no road transport data
Indonesia	1998	1000			169000	62539	11343.2	[12]	no road transport data

Passenger Transport - Performance									
Country	Year	Unit	Road (individual)	Road (public)	Railway	Inland Waterways	Air	Source	Remarks
Japan	1997	mill pass km	704000	93000	395000	5400	73000	[15]	
Germany	1998	mill pass km	755700	75900	66500		37500	[7]	
USA	1997	mill pass km	6412348	267765	42379	562	745128	[14]	
Russia	1998	mill pass km		225600	199400	730	55500	[22]	public transport only, railway including
Kazakhstan	1999	mill pass km		7513	8800	0.4	2100	[17]	public transport only
Hungary	1999	mill pass km		11265	9513			[23]	public transport only, other: 3554
Switzerland	1995	mill pass km	77447		13408			[21]	share of road and rail only, road incl. public

Note: inland waterways contain coastal shipping and ferry transport

Figure 9: Modal split of passenger transport in volume and performance.
 Sources as given in table 4.





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