

CHINESE RAILWAYS IN THE CONDITIONS OF GLOBAL ECONOMIC CRISIS

Dr. hab., Prof. Sergey Tarkhov, ©21.03.2010
Institute of Geography, Russian Academy of Sciences,
29 Staromonetny per.29, Moscow, Russia
tram-tarkhov@mtu-net.ru

The global economic crisis started in 2008 has led to the reduction of export volumes of China (-26% in January – February 2009 in comparison to the same period of 2008), and many export-orienting undertakings mostly located in maritime provinces of South-Eastern and Eastern China (mainly in Guangdong, Zhejiang, Fujian provinces), and in largest economic centers of others parts of the country have been crushed also. So, 67,000 small and middle size undertakings were bankrupted during the first half of 2008. As a result the production volume in adjacent branches of economy was reduced. The leading economic clusters of high-tech (Bohai coast with Tianjin and Hebei's cities; delta of Jangzter river with cities of Jiangsu and Zhejiang, and also Shanghai; delta of Zhujiang river in Guangdong province; coastal stripe of Fujian) have suffered most seriously.

The closure of many undertakings and the reduction of volume production of remaining undertakings have led to sharp increase of unemployed workers. The number of jobless people was very high before the crisis (9%, i.e. 73 million). But the crisis increased this number drastically. Exact number of it is unknown, but by approximate estimation it is near 90-100 millions. It is known that the number of migrants who left countryside and worked in the cities was 210 million in 2008, and more than 20 millions of it left the coastal centers in February 2009 to their native countryside communities in inner areas (Jiangsu, Anhui, Hubei, Hunan, Guizhou, Guangxi provinces, Chongqing municipality).

Worsening of social circumstances and the closure of many industrial undertakings just after the finishing of the Beijing Olympics of 2008 have stimulated the Chinese government to adopt the program of overcoming the social and economical consequences of the global crisis in the late fall of 2008. The problem with unemployment must be solved due to arrangement of mass public works including the development of the agriculture, infrastructure (including the transport system of public use and railways), the construction of cheaper residential estates, the fuel and energy savings, the increasing of social charges.

Financial crisis later transformed into global economic crisis hit the economy of China at the autumn 2008. The government has accepted the package of arrangements in the sum of 4 trillion of Yuan (586 billions of USD) in November 2008, which must stimulate the development of national economy, reduction of unemployed, expansion of inner demand. New transport construction became as the main “locomotive” of realization of this package. Its main stake was assigned to the construction of new railways and modernization of old lines.

Why transport and railways were chosen? The fact is that the old railway network was behind the fast growing economy, but express motorway network was expanded rapidly in 2000-ties reached 60,000 km in 2008. The economy needed more the new railways, especially for transportation of mass goods like coal. The growth of transport network in 2000-ties was delayed nevertheless (see table 1).

Table 1.

The growth of railway and road networks, freight and passenger turnover of automotive and railway transport of China in 1995-2007 (by the end of the year)

	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008
Length of railway network, 000 km	59.7	68.7	70.1	71.9	73.0	74.4	75.4	77.1	78.0	79.1
Length of electrified railways, km	9,703	14,864	16,877	17,409	18,060	18,562	19,408	23,435	24,047	26,000
Length of double tracks,	16,909	21,408	22,640	23,058	23,702	23,841	24,497	25,244	25,794	...

km										
Length of all roads, 000 km	1157.0	1402.7	1698.0	1765.2	1809.8	1870.7	3345.2	3457.0	3583.7	...
Length of express motorways, 000 km	2.1	16.3	19.4	25.1	29.7	34.3	41.0	45.3	53.9	60.3
Length of roads of 1-4 classes, including motorways, 000 km	910.8	1216.0	1336.04	1382.9	1438.7	1515.8	1591.8	2282.9	2535.4	...
The volume of goods transported by railways, million tons	1658.6	1780.2	1925.8	2049.6	2211.8	2490.2	2693.0	2882.2	3142.4	3300
The volume of goods transported by roads, million tons	9.404	10.388	10.560	11.163	11.600	12.450	13.418	14.663	16.394	...
Number of passengers transported by railways, million	1027,45	1050,73	1051,55	1056,06	9726,0	1117,64	1155,83	1256,6	1356,7	1460
Number of passengers transported by motor transport, million	10.408	13.474	14.028	14.753	14.643	16.245	16.974	18.605	20.507	...
Railway goods turnover, billion tonne-km	1304,95	1390,2	1457,5	1565,8	1724,7	1928,9	2072,6	2195,4	2379,7	...
Motor transport goods turnover, billion tonne-km	469,5	612,9	633,0	678,2	709,9	784,1	869,3	975,4	1135,5	...
Passenger turnover by railways, billion passenger-km	354,7	453,3	476,7	496,9	478,9	571,2	606,2	662,2	721,6	...
Passenger turnover by motor transport, billion passenger-km	472,6	665,7	720,7	780,6	769,6	874,8	929,2	1013,1	1150,6	...

Sources: <http://www.stats.gov.cn/tjsj/ndsj/2008/indexeh.htm>
<http://www.stats.gov.cn/tjsj/ndsj/2005/indexeh.htm>

Large-scale railway construction becomes the important stimulus for expansion of inner demand against the background the economic growth rate fall, the reduction of export volumes, and rising unemployment. It needs the big financial expenditures, the increase the employees number, the development the industrial branches producing the construction materials, rails, rolling stock, railway equipment. So, the mass railway construction leads to the GDP increase, promotes the economical growth due to involvement of the new resources (natural and human ones) and the expansion of economic centers network; accelerates the industrialization, the urbanization of the territory; socializes the population of backward areas and involves it into economic progress. New railways let enlarge carrying and network capacity (by means its electrification, track doubling, velocity accelerating) of whole transport system, and reliability and security of communication (due to creation of parallel and bypass lines, new closed circuits in the network), improve transportation conditions for people and goods, lead to reduction of transport costs due to shortening of routes and the time of deliveries.

Chinese investment in railway construction made up 180 billion yuan in 2007 (RMB; 1 USD = 7,3872 RMB in November 2007) and 330 billion yuan in 2008 (1 USD = 6,8527 RMB in December 2008). 600 billion yuan were provided for construction of 5,148 km of railway for 2009 (1 USD = 6, 8305 RMB in March 2010). The government has planned a record 823.5 billion yuan for 2010 to extend the network to 91,000 kilometers by the end of this year.

Such an enlargement of railway investment will stimulate the creation of 6 million jobs in 2009, demand of 20 million tonnes of steel and 120 million tonnes of cement, mass production of technical equipment for railways, new rolling stock and carrier, tractive substations, depots, repairing works. For example, 60 billion yuan (8,8 billion USD) were allocated for the construction of high-speed passenger railway Beijing – Shanghai in 2009, including 2 million

tonnes of steel and 12 million of cement; 600,000 workers were engaged in the building of the railway beds and tunnels in the beginning 2009.

The crisis has forced the government to revise the old plans of expansion and modernization of transport network and the rates of railway construction. The government made the final decision on 31 October 2008, and Ministry of Chinese Railways adopted the revised medium-term and long-term plan of railway building on 27 November 2008. If the old plan (adopted by State Council on 7 January 2004) proposed the network length to bring up 100,000 km by 2020, this limit was upleveled to 120,000 km by new revised plan. It means the new 41,000 km will be build instead former 16,000 km. The construction of 10,000 km new rail lines (70 projects) was started in 2009, and more 10,000 km – in 2010. The length of Chinese railway network will make up 91,000 km to the end of 2010, and it would be 110,000 km by 2012, including 13,000 km with train velocity more than 200 km per hour.

Construction and delivery of new rolling stock in 2009-12 will cost 500 billion yuan (100 billion yuan every year, i.e. 14.7 billion dollars). Chinese rail car building plants have got the purchase orders to produce 800 high-speed passengers trains, 7900 locomotives with strong tractive power, 25,000 passenger rail cars.

The Ministry of Chinese Railways will get 5 trillion yuan (732 billion USD) from the national budget for implementation all these plans of railway extension and modernization during 2009-2020. The railway network will achieve to 120,000 km by 2020, including 18,000 km lines with train velocity more than 200 km per hour.

Extension and modernization of railway network in China follows three directions:

- 1)renovation and technical improvement of old railway lines by means of its electrification, doubling of tracks, technic renovation of rail nodes, signalling system etc.;
- 2)construction of new railway lines;
- 3)construction of high-speed passenger railway lines.

New railways

The railway network of China has been extended from 51,700 km (1978) to 86,100 km (2009). 63,400 km of it belong to the state, 8,500km – to joint-venture companies, and the rest – to local authorities. 24,400 km are electrified and 25,200 km have two tracks (39,8% of network). The standard gauge 1435mm is dominating, but some local and industrial lines have the narrow gauge.

The large-scale extension of network was carried out. For example, new unique mountainous Qinghai-Tibet railway has been built in 2001-06. It has 1956 km (new built section Golmud – Lhasa 1142 km) and crosses the mountains at the 4000m above sea level (this section takes 960km) and the permafrost area (600 km). 2,8 million passengers were transported here in two first years of its operation (1 July 2006 – 1 July 2008).

6,140 km of new lines were built in 2003-2007 that costed 522 billion yuan (72,5 billion USD). Many new interprovincial railways were built and opened since 2000 (see Table 2; the list of new lines built before see Tarkhov, 2003a and 2003b). Another 1719 km were laid in 2008.

Table 2. New railways built in China in 2000-2010

Presented by opening dates in chronological order (without high-speed passenger lines; see tables 7 and 8)

Railway lines (provinces)	Location, what places and provinces connects, its functions, notes	Length, km	Opening date
Chunwan – Luoding	Guangdong, built by private company	62	2000
Shenmu – Yan'an	North and center of Shaanxi	328	8.02.2002
Xinpu (Lianyungang) – Haian – Changxing (Zhejiang, west of Shanghai)	Connects the north of Jiangsu and the west of Zhejiang, western bypass of Shanghai	571	5.12.2002; completely in 2005
Neijiang (Sichuan) – Yibin – Zhaotong – Lupanshui (Guizhou) – Kunming (Yunnan)	South-east of Sichuan, extreme west of Guizhou, north-east of Yunnan; construction finished on 19.09.2001, temporary operation started since 2002	872	15.10.2003
Zhanjiang (Guangdong) – Qiongzhou Straits – port Nangang (Hainan)	Freight railway ferry between ports of Guangdong and island Hainan; passenger trains ferry Haian –	345	7.01.2003

	Haikou started operation since 5.12.2004		
Dazhou – Wanzhou	To the north-east of Chongqing; part of line Wanzhou – Yichang which under construction (see table 3)	157	2004
Nanjing – Yangzhou – Nantong – Qidong (Jiangsu)	To the east of Nanjing along the northern bank of Yangtze (Chang Jiang) river up to its mouth; for opening-up the coastal areas of Jiangsu; the section Nanjing – Yangzhou opened in 2004	357	2004-2006
Xinyi (Xin'an) – Linyi – Jiaoxian (near Qingdao)	Connects the north of Jiangsu and south-east of Shandong; shortening the way between Shanghai and Shandong	302	2004-2006
Suining (Sichuan) – Chongqing – Huaihua (Hunan)	Sichuan – Chongqing – west of Hunan; opened only section Chongqing – Huaihua	625	End of 2005
Ganzhou (south of Jiangxi) – Longyan (south-west of Fujian)	Between provinces Jiangxi and Fujian; construction started on 8.12.2001; investment 6.33 billion yuan	277 (280)	2005
Xilinhot – Sanggin Dalai – Zhenglan Qi	Eastern part of Inner Mongolia; for carrying of coal to the big fuel-burning power plant	152	2006?
Lyugou – Dunhuang	Extreme north-west of Gansu, branch from the station Lanxin to the south	169	2.03.2006
Daliuta (district Shenmu, Shaanxi) – Shozhou (Shanxi)	From the border of Inner Mongolia on the north of Shaanxi to the west of Shanxi; 2 nd track; coal railway	266	25.03.2006
Xi'an – Nanyang – Xinyang – Huangchuan – Hefei – Nanjing	Connects the south of Shaanxi, south of Henan to Anhui and Nanjing; load-off the Longhai Railway; section Hefei – Nanjing opened in April 2008	1129	18.04.2006
Golmud (Qinghai) – Tanggula – Amdo – Nagqu – Lhasa (Tibet)	Qinghai-Tibet railway connected the west of Qinghai and the capital of Tibet; part of line Lanzhou – Lhasa (1956 km); investment 26.21 billion yuan (3.16 billion USD)	1142	1.07.2006
Lushunkou (Dalian; Liaoning) – Yantai (Shandong)	Railway ferry through Bohai Haixia (Straits)	160	5.11.2006
Dongsheng – Wuhai	South-west of Inner Mongolia	360	2007
Haikou (Xinhai) – Danzhou – Dongfang – Sanya	Western section of circular line along the west coast of island Hainan; renovated line, works started in October 2005	364	18.04.2007
Tangshan – island Caofeidian (Bo Hai Wan)	Hebei; to new site of metallurgic works Shoudu, moved to this island from Beijing	70	.06.2007
Ji'an – Jingganshan	West of Jiangxi	81	28.06.2007
Quzhou – Changshan	West of Zhejiang; built by Changshan joint-venture company with contribution of private investment	41	28.09.2007
Weihe – Yabuli	South-east of Heilongjiang, the branch south of line Harbin – Mudanjiang to serve the ski resort	24	6.12.2007
Hefei (Anhui) – Nanjing (Jiangsu)	Connects the capitals of Anhui and Jiangsu provinces	166	19.04.2008
Tongling (south of Anhui) – Jiujiang (north of Jiangxi)	Along right bank of Yangtze River (Chang Jiang) in the south of Anhui province; with bridge over lake Poyang Hu (5,5 km); provides the access to the mountains Jiuhuashan; construction started in May 2005	251	1.07.2008
Baihe – Helong	In south-east of Jilin province, near the border with North Korea, in Changbaishan mountains; connects the deadend railway stations in through trunk line along Chinese – Korean border from Tonghua via Tumen to Mudanjiang (Heilongjiang)	104	20.12.2008
Litang (Guangxi) – Zhanjiang (Guangdong)	Exit from Guangxi province to the port at Southern Chinese Sea	...	.05.2009
Suining (Dazhou) – Chengdu	Sichuan, Mixed passenger & freight HSR connecting Suining & Chengdu	148	30.06.2009
Fuzhou – Putian – Quanzhou – Jinjiang – Xiamen	Along the coast in Fujian province; construction started in October 2005	275	20.07.2009
Wenzhou – Fuzhou	South of Zhejiang – north of Fujian; opening-up of coastal areas; construction started in August 2005	298	28.09.2009
Dali – Lijiang	north of Yunnan	165	28.09.2009
Ningbo – Taizhou – Wenzhou	Zhejiang	282	28.09.2009
Urumqi – Junggar	north of Xinjiang, to coal fields in east part of Junggar Pendi	264	18.11.2009
Jinghe (west of Xinjiang) – Yining (Gulja)	North-Xinjiang Railway	286	18.12.2009

- Horgos (border of Kazakhstan)			
Linhe (Bayannur, west of Baotou) – Qekou (Ejin Qi hoshun)	From the centre of Inner Mongolia to cross point on Mongolia border, west of Inner Mongolia, through deserts Ulan Buh Shamo and Badain Jaran Shama	768	20.12.2009
Kuytun – Karamay – Beitun	Altay district, north of Xinjiang	469	29.12.2009
Qaidar – Muli	Qinghai, branch of Qinghai-Tibet railway to coal deposit Muli	142	1.01.2010
Yichang (Hubei) – Wanzhou	Connected west of Hubei and north-east of Chongqing municipality; velocity 160 km per hour	377	30.04.2010

Sources: <http://english.peopledaily.com.cn/> and <http://russian.people.com.cn/> for 2001-2010

Existing railway magistral do not cope with rapidly growing freight flows. The trunk railways (Beijing – Guangzhou, Beijing – Shanghai, Beijing – Harbin, Lianyungang – Lanzhou) are overloaded (the freight volumes of main railway lines are indicated in Table 4, passengers ones – in Table 6).



Source: www.flickr.com/photos/raenoll/1084950205/

Existing important coal railways cope hardly with rapidly growing volumes of coal: Datong – Qinhuangdao (790,000 tonnes of coal were transported here everyday in 2006 and more than 1 million tonnes per day in the beginning of 2009; train sets consisted of 208 rail cars operated here since March 2006, moving each one 20,000 tonnes of coal); Taiyuan – Datong; Houma – Yueshan. The demand of coal in fuel scarce areas increases very fast, this is why the construction of new railways to new coal fields started in Shanxi, Shaanxi, Inner Mongolia, Henan provinces. Capacity of latitudinal coal magistral from Shaanxi and Shanxi to seaports, from Xinjiang and west parts of Inner Mongolia to the Central China must be increased after its completion. They could let pass up to 2.5 billion tonnes of coal every year by 2020 after technical renovation of old coal railways and construction new ones.

Mass construction of many interprovincial lines started in 2003-2010. They must connect neighbour provinces, and some border provinces to adjacent countries also. The list of lines under construction is presented in Table 3 (the information in Chinese sources is not always complete, this is why in some table cells are not complete).

Table 3. Railways of China under construction

The lines are ordered geographically: north-east, center, east, south, north-west

Railway lines (provinces), notes	Length, km	Investment volume, billion yuan (billion USD)	Dates of start construction works and its expected completion
Qianjin – Fuyuan (east of Heilongjiang, opposite Habarovsk)	169	2,2 (0,323)	2008-10
Harbin – Zhaodong – Anda – Daqing – Qiqihar (west of Heilongjiang); passenger, 200 km per hour	300	....	2009-
Suifenhe – Dongning (Heilongjiang) – Tumen – Helong – Tonghua (Jilin) – Dandong (Liaoning) – Zhuanghe – Dalian; the length of new sections 410 km	1389	12,7 (1,58) + 1,88 (0,238)	2006-09
Changchun – Changbai Shan (Jilin)	94	...	2007-
Changchun – Jilin (Jilin)	96	...	2007-11
Tonghua (Jilin) – Guanshui (Heilongjiang)	180	4,5 (0,662)	2009-11
Qianyang – Zhuanghe (Liaoning)	165	3,75 (0,551)	2009-11
Qian'an – Caofeidian (Hebei); coal railway to load-off the old coal line Datong – Qinhuangdao (will transport 130 million tonnes of coal per year)	213	4,8 (0,593)	2005-08?
Ordos (Inner Mongolia) – Caofeidian (near Tangshan, Hebei) for coal transportation	1000	...	2009-
Fuxin (north-west of Liaoning) – Xinqiu – Bayan Ula (east of Inner Mongolia, Xilin Gol aymak)	488	5,86 (0,79)	2007-10
Ji'ning (center of Inner Mongol) – Zhangjiakou (Hebei), electrified	177	...	Project
Wanshuiqian (Baotou; west of Inner Mongolia) – Urad hoshun – Ganq Moa (border point with Mongolia) – Tavan-Tolgoy (Mongolia); for export coal (60 million tonnes per year) and copper from Mongolia to China	354	4,7 (0,69)	2009-11
Baotou (Inner Mongolia) – Xi'an (Shaanxi) for coal transportation, velocity of trains up to 160 km per hour	801	16,73 (2,26)	2007-10
Taiyuan (Shanxi) – Dingbian (2 tracks) – Zhongwei (Ningxia) – Yinchuan (Ningxia; 1 track), velocity 160 km per hour	944	30,32 (3,79)	2006-
Binzhou – Dongying – Weifang – Yantai – Weihai (Shandong)	588	...	2006-10
Qingdao – Yantai – Weihai – Rongcheng	...	...	2006-10
Luoyang (Henan) – Shiyang (Hubei) – Yichang? (Hubei) – Changde (Hunan) – Yongzhou (Hunan) – Hezhou (Guangxi) – Wuzhou – Yulin (Guangxi) – Zhangjiang (Guangdong)	1180?	...	2005-
Nanjing (Jiangsu) – Anqing (Anhui), passenger, velocity 200-250 km per hour	258	25,7 (3,76)	2008-13
Hefei – Bengbu (Anhui)	131	10,2 (1,49)	2009-
Shanghai – Nantong (Jiangsu)	114	21,93 (3,09)	2009-
Nanchang – Jiujiang (Lushan; north of Jiangxi), passenger, parallelly to line Beijing – Kowloon	131 (97)	6 (0,76)	2006-10
Hengyang (south-east of Hunan) – Chaling (south-east of Hunan) – Jingtangshan (west of Jiangxi) – Ji'an (west of Jiangxi)	211	...	2008-12
Wenzhou (Zhejiang) – Fuzhou (Fujian), 200 km per hour, with 53 tunnels	298	17,48 (2,5)	2004-06.2009
Longyan – Xiamen (Fujian)	171	6,48 (0,831)	.12.2006-
Xiangtang (south of Nanchang, Jiangxi) – Putian (south-east of Fujian) with branches to Fuzhou (Fujian) и Yongtai (north of Putian, Fujian) – Putian (Fujian)	604	51,8 (7,62)	2008-12
Xiamen (Fujian) – Shantou (Guangdong) – Shenzhen (Guangdong)	502	41,7 (5,7)	2007-11
Shaoguan (north of Guangdong) – Ganzhou (south of Jiangxi)	194	6,18 (0,90)	2009-12
Airport Shenzhen – Airport Hong Kong	...	...	2009-11
Lines in the delta of River Zhujiang (Guangdong), i.e.	400,3	37,65	18.12.2005-10
-Guangzhou – Shenzhen – Hong Kong, passenger	...	...	18.12.2005-10
-Guangzhou – Zhuhai	...	...	18.12.2005-10
-Cenxi (south-east of Guangxi, near the border of Guangdong) – Maoming (section of the line Luoyang – Zhanjiang)	...	...	18.12.2005-10
Haikou – Qionghai – Wanning – Lingshui – Sanya (eastern part of Hainan circular line), passenger, 200 km per hour	308	19,2 (2,5)	2007-11
Guiyang (Guizhou) – Guilin (Guangxi) – Hezhou (Guangxi) – Guangzhou (Guangdong), 200 km per hour	857	85,8 (12,53)	2008-12
Luoding (west of Guangdong) – Cenxi (south-east of Guangxi), building by private company	76	1,47 (0,184)	2006-10
Yongzhou (south of Hunan) – Yudin (south-east of Guangxi), section of	180	...	10.2005-

trunk line Luoyang – Zhanjiang			
Dali – Baoshan (west of Yunnan) – Ruili (border point with Myanmar)	350 (328)	14,7 (1,90)	2007-10
Lijiang (north of Yunnan) – Shangri-La (north-western point of Yunnan near the Tibet border)	139	9,2	2009-
Yuxi (south of Kunming, Yunnan) – Mengzi (south of Yunnan)	142	...	2006-
Yuxi (Yunnan) – Mojiang – Simao – Mengla – Mohan (border of Laos)	599	...	Project (2006)
district Fuling (east of Chongqing) – Lichuan (south-west of Hubei), 200 km per hour, section of future high-speed railway Shanghai – Wuhan – Chengdu	264	27,07 (3,98)	2008-13
Chengdu – Dujiangyan (center of Sichuan, west of Chengdu), 200 km per hour	66	13,3 (1,95)	2008-10
Chengdu – Wenjiang – Yaan – Kangding – Litang – Zogang – Bomi – Nyingchi – Lhasa (Sichuan – Tibet)	1629	...	2009-16
Lanzhou (Gansu) – Chongqing, 160 km per hour	820	77,4 (11,3)	2008-14
Chengdu (Sichuan) – Jiuzhaigou (north of Sichuan) – Min Shan mountains – Hezuo – Lanzhou (Gansu), including the section:	731	62 (9,1)	2009-14
-Lanzhou (Gansu) – Hezuo (Gannan-Tibet autonomous district of Gansu)	174	8,75 (1,3)	2009-
Lanzhou (Gansu) – Urumqi (Xinjiang), passenger, parallelly to line LanXin	1892	120 (17,57)	2009-
Hami – Lop Nur (Xinjiang)	370	3,28 (0,47)	2010-12
Golmud (Qinghai) – Ruoqiang (Qarkilik) – Korla (Xinjiang)	...	...	Under draft
Kashgar (Kashi) – Hotan (west – south-west of Xinjiang)	487	4,64 (0,676)	2008-11
Golmud (Qinghai) – Aksay – Dunhuang (Gansu)	530	...	2010-
Lhasa – Xigaze (south of Tibet, west of Lhasa)	254	11,0	2010-
Lhasa – Nyingchi (south-east of Tibet, east of Lhasa)	...	25,0	2010-

Sources: <http://english.peopledaily.com.cn/> and <http://russian.people.com.cn/> for 2001-2010

Lines under construction or under planning could be divided by spatial and socio-economic functions into the next types:

-*meridional trunk lines*: Lanzhou – Chongqing (through territory of provinces Gansu, Shaanxi, Sichuan) and Lanzhou – Chengdu (via Gansu and Sichuan provinces), Luoyang – Zhanjiang (via Henan, Hubei, Hunan, Guangxi, Guangdong), Beijing – Hefei – Fuzhou;

-*latitudinal trunk lines*: Nanjing – Anqing – Wuhan – Yichang – Wanzhou – Chongqing (along Chang Jiang), Nanjing – Hefei – Xinyang – Xi'an (completed), Shanghai – Wuhan – Lichuan – Chongqing – Chengdu (high-speed one);

-*tangential lines along land borders and coastlines*: Suifenhe – Dongning – Hunchun – Tumen – Helong – Baihe – Tonghua (with a branch to Benxi) – Dandong – Zhuanghe – Dalian in Manchuria along Russian and North Korean borders; Wenzhou – Fuzhou for opening-up the East China Sea coast (Zhejiang and Fujian provinces); Fuzhou – Xiamen and Xiamen – Shantou – Shenzhen along maritime coast between Fujian and Guangdong provinces;

-*interprovincial lines*: Tonghua – Guanshui (between Jilin and Heilongjiang provinces), Taiyuan – Zhongwei – Yinchuan (Shanxi – Ningxia), Baotou – Xi'an (Inner Mongolia – Shaanxi), Nanjing – Anqing (along Chang Jiang, between Jiangsu and Anhui), Hangzhou – Huangshan (between Zhejiang and Anhui), Henyang – Chaling – Ji'an (Hunan – Jiangxi), Xiangtang – Putian (Jiangxi – Fujian), Guangzhou – Guiyang (Guangdong – Guizhou), Guangzhou – Nanning (560 km, between Guangdong and Guangxi), Luoding – Cenxi (Guangdong – Guangxi), Wanzhou – Yichang (Chongqing – Hubei), Golmud – Chengdu (Qinghai – Sichuan), Zhonggar – Shuozhou (Inner Mongolia – Shanxi), Linhe – Qekou (Inner Mongol) – Hami (Inner Mongolia – Gansu – Xinjiang; 1390 km), Golmud – Korla (Qinghai – Xinjiang), Xining – Zhangye (Qinghai – Gansu);

-*inner-provincial lines*: in Heilongjiang (Qianjin – Fuyuan), Jilin (Jingyu – Songjianghe in south, Helong – Nanping, Shijiazhuang – Yangtungshan, Changchun – Changbaishan, Changchun – Jilin), Liaoning (Qianyang – Zhuanghe; 165 km), in Inner Mongolia (5,300 km under construction, including Linhe – Qekou, Zhangjiakou – Jin'ing), Shanxi (Shijiazhuang – Taiyuan, Datong – Yuanping), in north and south of Shandong province (Dongying – Weifang – Denzhou – Yantai – Weihai, 588 km; Longkou – Yantai, Linqu – Yishui – Dalailong, Pingshang – Lanshan, Zaozhuang – Linyi), in Anhui (Hefei – Bengbu; 131 km; a section of future high-speed line Beijing – Fuzhou; Huangshan – Jinhua, 58 km), Jiangsu (5 lines with length 1600 km, including Shanghai – Nantong), Zhejiang (Ningbo – Taizhou – Wenzhou), Jiangxi (Nanchang – Jiujiang, 131 km; opened in 2009), Fujian (Fuzhou – Xiamen, Longyan – Xiamen), Guangdong

(Guangzhou – Dongguan – Shenzhen, Guangzhou – Zhuhai, Guangzhou – Foshan, Dongguan – Huizhou, Guangzhou – Huadu – Qingyuan (N of Guangzhou), Zhongshan (S of Guangzhou in Zhujiang Delta) – Nansha – Humen with a bridge over Zhujiang River at its mouth), Guangxi (Tiandong – Debao near Vietnam border, 73 km), Hainan (Haikou – Qionghai – Sanya; eastern semicircle of island), Yunnan (Dali – Baoshan – Ruili, Dali – Lijiang with future extension to Shangri-La, Yuxi – Hekou, Yuxi – Mohan at Laos border), Sichuan (Chengdu – Dujiangyan, Mianyang – Chengdu – Leshan, Chengdu – Suining – Daizhou, Suining – Chongqing), Xinjiang (Kashgar – Hotan, Kuytun – Karamay – Beitun, Urumqi – Junggar).

-from inner areas to sea ports for export of raw materials: from central and southern parts of Shanxi province to port Rizhao (1200km; coal export through the areas of provinces Shanxi, Hebei, Henan, Shandong), from Jiangxi province to the ports of Fujian province (line Xiangtang near Nanchang to Putian and Fuzhou);

-for opening-up the deposits of mineral resources: Urumqi – Junggar (coal deposits in the north of Xinjiang), Wanshuiquan (near Baotou) – Bayannur – Ganq Moadao (coal and copper deposits in north-west of Inner Mongolia), Kuytun – Karamay – Beitun (iron and copper ores, oil deposits in north of Xinjiang);

-coal corridors: Baotou – Xi'an, Taiyuan – Zhongwei, Zhungar (south of Inner Mongolia) – Shuozhou (north of Shanxi), Ordos (south of Inner Mongolia) – Caofeidian (island in Bo Hai near Tangshan, Hebei; to move 200 million tonnes of coal every year).

To open-up the remote areas and connection it to high developed areas: there are plans to build the lines in 2009-2015 from undeveloped areas to the core areas between provinces Sichuan and Qinghai (Chengdu – Golmud), Sichuan and Tibet (Chengdu – Ya'an – Kanding – Litang – Bomi – Nyingchi – Lhasa, 1629 km; construction of its first section from Chengdu started in September 2009), Xinjiang and Qinghai (Korla – Golmud), Gansu and Qinghai (Golmud – Dunhuang; 530 km; Zhangye – Xining); inside Tibet Autonomous Region (Lhasa – Xigaze, 254 km by 2010 with further extension to Yadong near Sikkim border in India; Lhasa – Lhinjinze to south-east; Lhasa – Nyingchi to the east).

To arrange constant land connection: there is a plan to build the bridge over Straits Qiongzhou in 2012-2020 to connect mainland railway system with railway network of island Hainan (south of China).

Transborder lines. Set of new lines under construction or under planning will connect the Chinese border lands to adjacent countries: North-Xinjiang railway (Jinghe – Yining – Horgos; opened in December 2009) will be extended through Saryozek to Almaty (Kazakhstan; construction of 293 km Kazakhstan section Zhetygen – Horgos started in August 2009); line Fuxin (west of Liaoning) – Bayan Ula (Inner Mongolia) first of all will be extended more 230 km to Zhuengadabuqi (border point with Mongolia), and later – to Choybalsan (east of Mongolia) and Borzya (south of Chita, Russia); line Wanshuiquan (near Baotou, Inner Mongolia) – Bayannur – Ganq Moadao (Mongolia crossborder point) will be extended to Mongolia to export from there the coal and copper ore to China.

There are plans to start the construction of new transborder lines to Myanmar and Bangladesh (line Dali – Ruili will be extended inside this country up to sea port Chittagong in Bangladesh; part of future 3rd Euroasian railway magistral which connects ports of Guangdong province with ports of Western Asia and Eastern Europe), to Kyrgyzstan and Uzbekistan (Kashgar – Torugart (Kyrgyzstan border point) – Naryn – Andizhan), to Nepal (Xigatze – Hasha; 2013; 400 km), to Laos (Batdeng – Lokning, eastern section of future Trans-Asian railway). The project to arrange the railway container ferry between China (Shandong) and South Korea through Yellow Sea was proposed in 2006 with the route Weihai – Pyongtaek.



Source: http://china.otspecial.org/blogimages/china_railwayfuturemap_large.jpg

Renovation of overloaded railway trunk lines. Many overloaded trunk railways (see Table 4) were electrified and its tracks were doubled in 1990-2000-ties (details see Tarkhov, 2003a and 2003b). Nevertheless China has a lot of single track lines and non electrified railways, including trunk ones. This is why the electrification and doubling tracks are under way now in many areas of the country.

Table 4. Main directions of freight flows by Chinese railways in 2002-2007 (000 tonnes in both directions together)

Line	2002	2003	2004	2005	2006	2007
Datong – Taiyuan – Fenglingdu (southern branch)	111.680	123.890	142.890	164.810	194.250	155.830 + 62.850
Taiyuan – Jiaozuo – Liuzhou	82.060	82.800	89.550	86.370	94.690	58.780 + 40.000
Shanghai – Kunming	...	...	...	...	...	89.600
Lianyungang – Lanzhou (Longhai Railway)	63.570	66.770	69.400	72.120	74.740	73.800
Beijing – Harbin	...	...	82.740	...	...	15.260
Beijing – Guangzhou	71.870	69.980	72.640	67.890	67.840	70.120
Baotou – Lanzhou	38.170	42.780	52.530	50.100	60.240	68.600
Tianjin – Shanghai (since 2007 from Beijing)	53.040	53.960	54.950	54.050	55.040	57.000
Harbin – Manzhouli	31.370	34.640	39.800	46.850	54.390	36.420
Shijiazhuang – Taiyuan	37.600	39.740	44.570	51.200	53.660	57.650
Lanzhou – Urumqi	33.660	35.580	35.700	42.310	46.960	27.150
Beijing – Kowloon	26.440	32.650	38.820	39.510	39.290	37.780
Harbin – Dalian	32.330	32.630	37.050	37.100	38.540	...
Bingjing – Baotou	58.810	58.590	48.650	31.190	37.150	45.140
Shijiazhuang – Xinjiang	...	...	...	37.600	36.970	...
Xinjiang – Rizhao	27.280	29.550	31.530	...	36.970	40.910
Hangzhou – Ganzhou	24.640	26.730	33.060	32.110	35.550	...
Chengdu – Kunming	19.030	19.810	22.590	23.690	25.890	28.000
Zhuzhou – Guiyang	19.930	21.670	22.600	22.940	25.510	...
Guiyang – Kunming	17.770	20.720	22.080	21.690	24.590	...
Harbin – Suifenhe	11.780	12.450	13.640	16.460	16.850	9.630

Beijing – Shenyang	34.380	31.810	18.870	17.280	16.610	...
Qingdao – Jinan	37.620	18.900	20.390	18.190	15.690	16.560
Baoji – Chengdu	9.880	12.540	13.580	12.240	11.820	10.050
Nanning – Kunming	...	...	...	...	...	15.730
Datong – Qinhuangdao	4.160	3.470	6.070	8.810	10.070	19.480
Qinghai – Tibet Railway	7.070	7.640	9.420	8.340	8.710	12.860
Shijiazhuang – Dezhou	3.790	3.730	4.080	6.020	6.680	5.520
Beijing – Qinhuangdao	4.400	3.520	5.840	4.160	4.310	...
Shanghai – Hangzhou	2.020	2.090	2.550	2.170	1.800	...

Sources: <http://www.stats.gov.cn/tjsj/ndsj/2008/indexeh.htm>

<http://www.stats.gov.cn/tjsj/ndsj/2005/indexeh.htm>

Lines Xiangfan (north-west of Hubei) – Chongqing, Dazhou – Chengdu (Sichuan), Guiyang (Guizhou) – Liuzhou (Guangxi; way was shortened from 608 km to 489 km) were modernized in 2005-2008. Line Qingdao – Zibo – Jinan (360 km; Shandong) was completely renovated in 2008 and is using now as passenger line, but freight trains go through new section laid in the northern part of this province. Railway Baoji (west of Shaanxi) – Chengdu (capital of Sichuan) crashed by strong earthquake in May 2008 have been restored and renovated in 2009. Penetration line from Vietnam (Hanoi – Laokai – Hekou – Kunming) will be renovated by 2015 (planned investment 12.8 billion yuan).

Construction of second tracks. 2808 km of new second tracks were laid in 2003-2007, and 1935 km else in 2008. Second track was laid in the section Zabaykal'sk (Russia, south of Chita) – Manzhouli (China) and inaugurated on 1 November 2007. Construction of second track at the section Urumqi – Jinghe (line Urumqi – Alashankou) and section Turpan – Korla (line Turpan – Kashgar) started in 2007 (both in Xinjiang).

Construction of second track is under way on the eastern section of Qinghai – Tibet railway. Its first section (Lanzhou – Xining, 170 km; investment 390 million USD) was laid in 2005-2009 and inaugurated in April 2009. Next section 290 km of line Xining – Golmud will be laid by 2012.

Laying of second tracks on line Xi'an – Hefei (957 km; investment 37.2 billion yuan) started in 2009 and would be finished by 2012.

Railway Guangzhou – Shenzhen has 3 tracks now (1st track has been laid in 1911, 2nd one – in 1989, 3rd – in 1994). Construction of 4th track started in 2005 and is under way now.

Railway electrification. The length of electrified network was 23.435 km at the end of 2006, 26.000 km (32,7% of all network) at the end of 2008, and 27.000 km in May 2009. 6529 km were electrified in 2003-2007, another 1955 km – in 2008. The list of sections under electrification is presented in Table 5. 50% of all goods and near 50% of all passengers were carried by electric trains in China.

Table 5. Railway lines of China under electrification

Ordered geographically: north-east, center, east, south, north-west

Railway lines (provinces)	Length, km	Dates of start (completion) of electrification works
Datong (Shanxi) – Hulu (Ulan Qab) – Guchengwan (Baotou; Inner Mongolia)	452	September 2007 (May 2009)
Beijing – Xiangtang (south of Nanchang; Jiangxi) of line Beijing – Kowloon	1480	2008-
Tianjin – Bazhou	75	2008-
Taiyuan (Shanxi) – Shaanxi – Zhongwei – Yinchuan (Ningxia)	944	2006-
Macheng – Wuhan (Hubei)	81	2008-
Hengfeng (east of Jiangxi) – Nanping (Fujian)	299	November 2008 (2009)
Wenzhou (Zhejiang) – Fuzhou (Fujian)	298	December 2004 (July 2009)
Guiyang (Guizhou) – Guilin (Guangxi) – Guangzhou (Guangdong)	857	October 2008 (2012)
Chengdu – Dujiangyan (Suchuan)	66	November 2008 (2010)
Lanzhou (Gansu) – Chongqing	820	2008-14
Lanzhou (Gansu) – Xining (Qinghai)	170	2006 (April 2009)
Jiayuguan (Gansu) – Alashankou (Xinjiang)	...	2008
Jinghe – Yining – Horgos (Kazakhstan border)	286	November 2004 (18.12.2009)

Sources: <http://english.peopledaily.com.cn/> and <http://russian.people.com.cn/> for 2001-2010

Plan of railway network extension published in November 2008 assumes the electrified network must be reach 60% of all national railway network by 2020.

High-speed passenger railways. The Chinese government started the construction of network of high-speed passenger railways between large centers of opened-up areas of the country due to the existing old railways do not cope with rapidly growing passenger traffic and terribly overloaded by freight trains. The list of these lines is given in Tables 7 and 8. These new lines must relieve the main lines traditionally overloaded by passengers (see the list the most overloaded passenger lines in Table 6). The main target of these high-speed railways is the drastical reduction of journey time between main cities of the country.

Table 6. Main directions of passenger traffic in Chinese railways in 2004-2007
(000 passengers in both directions together)

Line	2002	2003	2004	2005	2006	2007
Beijing – Guangzhou	108.690	115.100	128.140	126.340	131.230	132.740
Beijing – Shanghai	92.600	89.460	105.620	108.920	127.860	131.100
Beijing-Harbin	85.140	75.610	...	84.650	78.300	56.270
Lianyungang – Lanzhou (Longhai Railway)	47.590	45.070	53.650	61.220	67.950	72.010
Shanghai - Hangzhou, Hangzhou – Ganzhou – (Kunming; since 2007)	54.960	52.220	60.710	61.180	60.430	76.480
Beijing – Kowloon	37.850	37.170	43.800	46.610	52.860	60.030
Baoji – Chengdu, Chengdu – Chongqing	20.740	20.370	23.610	24.490	27.840	24.760
Xiangfan – Chongqing	15.860	15.830	18.170	18.710	19.500	19.070
Bingjing – Baotou	15.750	14.040	16.040	16.350	18.740	18.540
Zhuzhou – Guiyang	14.690	13.170	14.800	15.790	16.790	...
Chengdu – Kunming	12.030	11.590	13.940	14.460	15.550	15.860
Jiaozuo – Liuzhou	18.000	16.010	17.410	14.920	14.280	14.390
Lanzhou – Urumqi	10.550	9.580	11.050	11.850	13.220	14.660
Beijing – Qinhuangdao	7.500	6.610	11.200	11.760	12.820	...
Guiyang – Kunming	9.770	9.780	10.780	11.150	11.990	...
Datong – Fenglingdu (Beijing; southern branch)	...	...	...	12.640	11.970	...
Yingtian – Xiamen	6.540	6.440	7.140	6.960	7.580	8.090
Baotou – Lanzhou	6.550	6.140	5.460	5.590	6.520	7.320
Datong – Fenglingdu (Beijing; northern branch)	...	...	...	5.630	6.510	...
Shijiazhuang – Dezhou	4.910	4.530	5.560	5.710	6.220	6.290
Shijiazhuang – Taiyuan	8.140	6.980	8.750	5.770	5.940	6.470
Xinjiang (Shijiazhuang) – Rizhao	2.880	2.840	3.950	4.530	5.380	5.340
Fenglingdu – Taiyuan	12.450	11.660	14.070	12.640	11.970	13.900
Taiyuan – Datong	5.410	4.890	5.330	5.630	6.510	7.850
Nanning – Kunming	3.870	4.080	4.760	3.010	2.860	4.630
Lanzhou - Qinghai, Qinghai – Tibet	4.130	3.930	3.750	3.550	3.830	5.520

Sources: <http://www.stats.gov.cn/tjsj/ndsj/2008/indexeh.htm>
<http://www.stats.gov.cn/tjsj/ndsj/2005/indexeh.htm>

First project of high-speed railway network for China was proposed in the middle of 1990-ties. It has supposed the construction of three meridional (Beijing – Shenyang – Harbin, Beijing – Shanghai, Beijing – Zhengzhou – Wuhan – Changsha – Guangzhou) and one latitudinal (Haizhou – Zhengzhou – Xi’an – Lanzhou) lines.

New plan of prior high-speed railways with common length 3,000 km have been adopted in January 2004, including lines Beijing – Tianjin, Wuhan – Guangzhou, Zhengzhou – Xi’an, Hefei – Nanjing. Later they decided (besides this plan) to connect all cities with population more than 500,000 inhabitants by high-speed passenger railways. Such a network would be served 90% of all nation population. First of all these railways must connect the largest nodes of Northern, Central and Eastern China.

The construction of high-speed railways started from the first one in north-east. This first line Qinhuangdao – Shenyang (405 km; velocity of passenger trains 200-250 km per hour) was built in 1999-2002 and opened to traffic on 12 October 2003. It goes parallely to main trunk line overloaded by freight trains.

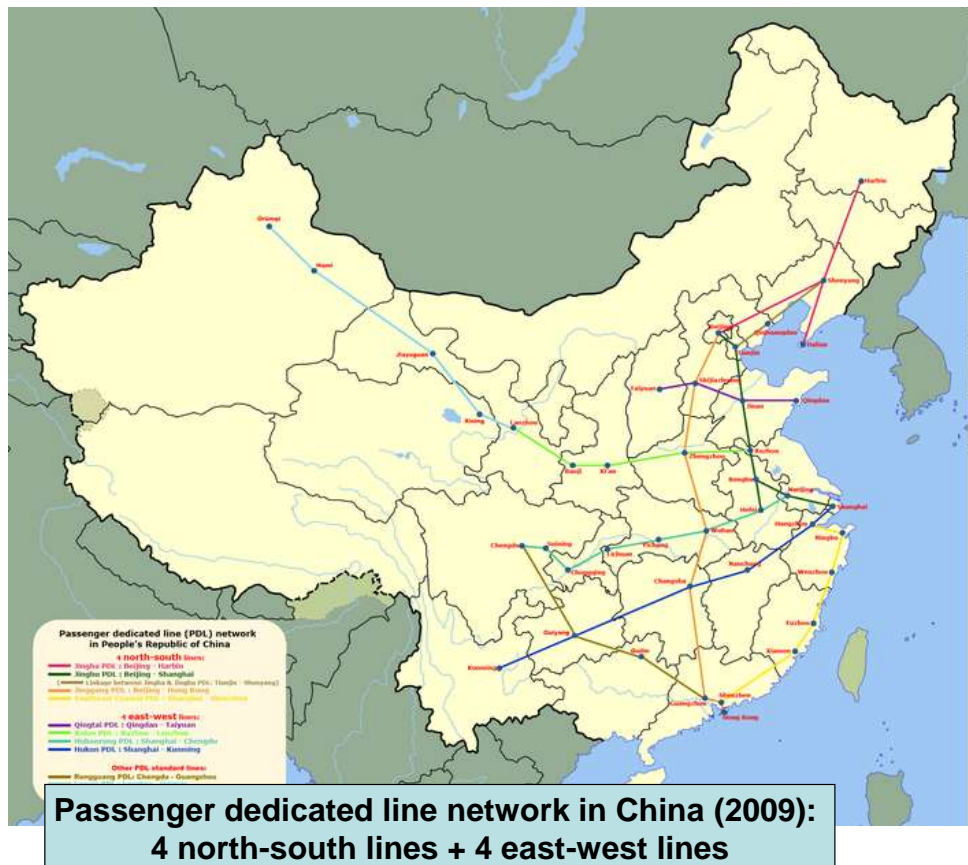
Second such railway Beijing – Tianjin (113 km) was built in 2005-2007 for service of the guests of Beijing Olympics-2008. The trains started its operation on 1 August 2008. The journey time there takes 30 minutes. These high-speed trains make 60 trips per day (with maximum

speed up to 350 km per hour), transporting 51,000 passenger per day (they carried 1,831,000 passengers during the August 2008). Next high-speed link Qingdao – Jinan has been opened in December 2008.

Two more high-speed passenger railways were put in operation on 1 April 2009: Wuhan – Hefei (250 km per hour; journey time 1 hour 50 minutes instead 7.5 hours before) and Taiyuan – Shijiazhuang (250 km per hour; the journey time reduced from former 5 hours to 1 hour). China had built and opened also high-speed railways Wuhan – Guangzhou in December 2009 and Zhengzhou – Xi'an in February 2010.

About 3,676 km of new track for running trains at speeds up to 350 kph have already been laid and put into operation up to March 2010.

200 high-speed trains (CRH) were in operation in May 2009. The first delivery of 60 sets (each set consists of 8 cars) was produced in Germany by Siemens license in 2005-2008 and assembled on the locomotive works in Tangshan (Hebei). This plant started the production of new remodelled trains. 773 CRH trains were in operation im March 2010. A new generation of high-speed trains will be put in operation in 2012, when it would run at 380 km/h along the trunk line Beijing – Shanghai.



Source: [http://en.wikipedia.org/wiki/File:4%2B4_PDL_network_in_China_\(English_version\).png](http://en.wikipedia.org/wiki/File:4%2B4_PDL_network_in_China_(English_version).png)

At present, at least 10,000 km of high-speed rail line is under construction in China (see Table 7).

High-speed line Beijing – Shanghai (Jinghu) is the prior project (1318 km). It will follow parallelly old line Beijing – Tianjin – Jinan – Xiuzhou – Bengbu – Nanjing – Shanghai with some deviations. Its construction started in April 2008. Its trains will have the velocity up to 350-380 km per hour (at first phase – 300 km per hour). The journey time between both cities would be reduced from 12 hours to 5 hours.

21 stations, the bridges with total length 1059 km will be build here. 1203 km rails (91% of tracks) were laid by the end 2008; the bridges (especially through Huaihe and Yangtze) were not built yet. The grounds along the route were bought. 50 billion yuan for this construction were spent in 2008. 113,000 workers from 700 construction firms were engaged in this project in

November 2008. They work on round the clock, and everyday spent 10,000 tonnes of steel, 3,5 tonnes of cement, 110,000 tonnes of concrete. 600,000 workers were here in the spring 2009. They completed all tunnels of this railway by the end 2009.

The vast network of high-speed railways is foreseen to be created by the program of network extension by 2012. They are distinguished by velocity into two types: 1) high-speed ones (operation of trains with velocity 250-350 km per hour); 2) rapid ones (200-250 km per hour). This network will consist of 4 meridional (Harbin – Shenyang – Dalian, Beijing – Wuhan – Guangzhou, Beijing – Nanchang – Hongkong, Beijing – Tianjin – Nanjing – Shanghai) and 3 latitudinal trunk lines (Beijing – Tianjin – Qinhuangdao – Shenyang, parallelly to Longhai railway, along Yangtze River). Lines and branches between adjacent big cities (see Table 7) will be built in addition. Final target of this program is creation of the integrated network of rapid passenger railways which must connect all cities with a population more than 500,000 inhabitants (first of all Beijing, Shanghai, Guangzhou, Wuhan, Xi'an, Chengdu). This network must cover the areas where 90% of population of China lives. The journey time between the largest cities will be reduced 2 times.

Lines Beijing – Shijiazhuang (270 km), Shijiazhuang – Zhengzhou – Wuchang (Wuhan; 841 km), Nanjing – Shanghai (295 km), Hefei – Nanjing (166 km), Nanning – Guangzhou (560 km), Tianjin – Qinhuangdao (261 km), Harbin – Dalian (904 km) are under construction now.

Project of high-speed line Shanghai – Hangzhou with Maglev technology (operation of trains with magnetic levitation and velocity 450 km per hour; length 175 km; investment 4.5 billion USD) planned before was rejected in the beginning 2009. The construction of usual rapid railway started on this trace on 26 February 2009. The high-speed trains will cover the distance 160 km in 38 minutes instead 78 minutes as before and will depart each 3 hours. The Ministry of Chinese Railways, administrations of Shanghai municipality and Zhejiang province, metallurgical works Baoshan are contributing the all construction costs of this line.

Table 7. High-speed passenger railways of China in operation and under construction
Ordered geographically: north-east, center, east, south, north-west

Line (provinces)	Length, km	Volume of investment, billion yuan (billion USD)	Maximal velocity of trains, km per hour	Dates of start and completion of construction works
Qinhuangdao (Hebei) – Shenyang (Liaoning)	405	15,7 (1,9)	160/200-250	1999-2003
Beijing – Tianjin	115	12,34 (1,49)	300-350	2005-2008
Shijiazhuang (Hebei) – Taiyuan (Shanxi)	190	12,64 (1,8)	250	2005-09
Hefei (Anhui) – Wuhan (Hubei)	351	16,8 (2,26)	250	2005-09
Harbin (Heilongjiang) – Shenyang – Dalian (Liaoning)	904	92,3 (12,3)	200-350	2007-13
Beijing – Tangshan (Hebei)	...	...	350	2009-
Tianjin – Qinhuangdao (Hebei) through Tangshan, Qian'an, Beidaihe	261	33,8 (4,97)	350	2008-
Tianjin – Tanggu (area Binhai in port zone of Tianjin), extension of line Beijing – Tianjin	39	...	300-350	2009-
Baoding (Hebei) – Tianjin	145	24 (3,52)	250	2009-
Beijing – Zhangjiakou (Hebei)	160	30 (4,39)	300	2009-
Beijing – Tianjin – Jinan – Nanjing – Shanghai	1318	220,94 (31,6)	300-350	2008-12
Qingdao – Jinan (Shandong)	364	...	250	2007-08
Beijing – Wuhan – Guangzhou – Hongkong, including sections:	2240	4.000	350	2009-12
-Beijing – Shijiazhuang (Hebei)	270 (281)	43,87 (6,4)	300-350	2008-
-Shijiazhuang (Hebei) – Zhengzhou (Henan) – Wuchang (Wuhan; Hubei) via Xingtai, Handan, Anyang, Hebi, Xinxiang, Zhengzhou, Xuchang, Luohe, Zhumadian, Xinyang	841 (876)	116,76 (17,1)	350	2008-13
-Wuhan (Hubei) – Changsha (Hunan) – Guangzhou (Guangdong)	1069	116,6 (17)	350	2005-09
-Guangzhou – Dongguan – airport Shenzhen (Guangdong)	87	19,69 (39,5 billion Hongkong dollars)	200	2008-11

-Shenzhen (Guangdong) – Xianggang (Hongkong)	26	...	200	2010-14
Zhengzhou (Henan) – Xi'an (Shaanxi)	505	70,3 (10,3)	350	2005-09
Hefei (Anhui) – Nanjing (Jiangsu)	166	...	200-250	2005-08
Shanghai – Kunshan – Suzhou – Wuxi – Changzhou – Danyang – Zhenjiang – Nanjing (Jiangsu)	295	...	350	2008-10
Nanjing (Jiangsu) – Hangzhou (Zhejiang)	249	31,38 (4,59)	350	2008-11
Shanghai – Hangzhou (Zhejiang)	159	29,68 (4,37)	350	2009-10
Hangzhou – Ningbo (Zhejiang)	150	21,39 (3,13)	250	2008-12
Ningbo – Taizhou – Wenzhou (Zhejiang)	282	...	200-250	2005-09
Nanning (Guangxi) – Guangzhou (Guangdong)	577	41 (6,0)	200	2008-12
Chengdu (Sichuan) – Chongqing	305	39,89 (5,85)	350	2010-15
Xi'an (Shaanxi) – Chengdu (Sichuan)	519	68,8 (10,0)	250	2010-14

Sources: <http://english.peopledaily.com.cn/> and <http://russian.people.com.cn/> for 2001-2010

The total length of all high-speed passenger railways in China (with train velocity 200 km per hour and more) will make up 7,000 km by the end 2010, 13,000 km by 2012 (including 8,000 km with velocity 200-350 km per hour and 5,000 km with velocity 200-250 km per hour), and 18,000 km by 2020. New high-speed railways (300 km per hour) Beijing – Harbin, Beijing – Fuzhou, Shanghai – Nanjing – Hefei – Wuhan – Chongqing – Chengdu, Lanzhou – Xi'an – Zhengzhou – Xuzhou (parallelly to Longhai railway), Lanzhou – Urumqi will be built by 2020. This network would be extended up to 50,000 km at a later date. It lets to accelerate passenger communication considerably and to reduce the journey time (see Table 8), to increase the network capacity, to dissolve the problem of overloading of the main railway nodes of China in the seasons of mass movements of people (Chinese Spring Festival, May 1 and October 1).

Table 8. Reduction of journey tome between largest cities of China after the buidling of high-speed passenger railways and some traditional railways

Ordered by dates of opening (indicated in **bold characters**) and then geographically like in Table 7

Railway (provinces)	Length, km	Journey time between end points of old line, hours and minutes	Journey time between end points of high-speed railway, hours and minutes	Time saving, hours and minutes	Data of construction start	Data of inauguration
OPENED HIGH-SPEED RAILWAYS						
Qinhuangdao (Hebei) – Shenyang (Liaoning)	404,64	...	...	...	.08.1999	12.10.2003
Hefei (Anhui) – Nanjing (Jiangsu)	166	4.00	1.00	3.00	29.12.2004	19.04.2008
Beijing – Tianjin	115	1.10	0.30	0.40	4.07.2005	1.08.2008
Qingdao – Jinan (Shandong)	364	2.35	1.55	0.40	28.01.2007	20.12.2008
Shijiazhuang (Hebei) – Taiyuan (Shanxi)	189,2	5.00	1.00	4.00	12.06.2005	1.04.2009
Hefei (Anhui) – Wuhan (Hubei)	351	7.35	1.55	5.40	8.11.2005	1.04.2009
Shenyang – Fushun (Liaoning)	66	1.30	0.49	0.31	2008	30.07.2009
Wenzhou (Zhejiang) – Fuzhou (Fujian)	298	14.25	1.40	12.45	12.2004	28.09.2009
Wuhan (Hubei) – Changsha (Hunan) – Guangzhou (Guangdong)	1068	11.00	2.45	8.15	23.06.2005	26.12.2009
Zhengzhou (Henan) – Xi'an (Shaanxi)	505	6.00	2.25	3.35	25.09.2005	6.02.2010
HIGH-SPEED RAILWAYS UNDER CONSTRUCTION						
Harbin (Heilongjiang) – Shenyang – Dalian (Liaoning)	904	...	...	...	23.08.2007	.02.2013
Beijing – Tangshan (Hebei)	...	...	0.30	...	1.10.2009	...
Tianjin – Qinhuangdao (Hebei)	261	...	...	...	8.11.2008	...
Baoding (Hebei) – Tianjin	145	...	...	...	2009	....
Beijing – Zhangjiakou (Hebei)	160	3.00	1.00	2.00	.08.2009	...
Beijing – Tianjin – Jinan – Nanjing – Shanghai	1318	12.00	5.00	7.00	18.04.2008	2012
Beijing – Wuhan – Guangzhou –	2240	...	...	...	2005	2013

Hongkong, including sections:						
-Beijing – Shijiazhuang (Hebei)	270 (281)	...	1.00	...	.10.2008	2013
-Shijiazhuang (Hebei) – Zhengzhou (Henan) – Wuchang (Wuhan; Hubei)	841 (876)	...	...	...	15.10.2008	2013
-Guangzhou – Dongguan – airport Shenzhen (Guangdong)	87	...	...	...	21.12.2008	End of 2011
-Shenzhen (Guangdong) – Xianggang (Hongkong)	26	...	...	...	...	...
Shanghai – Kunshan – Suzhou – Wuxi – Changzhou – Danyang – Zhenjiang – Nanjing (Jiangsu)	295	...	1.10	1.00	07.2008	.07.2010
Nanjing (Jiangsu) – Hangzhou (Zhejiang)	249	4.00	1.00	3.00	2008	2011
Shanghai – Hangzhou (Zhejiang)	159	1.18	0.38	0.40	26.02.2009	.04.2010
Hangzhou – Ningbo (Zhejiang)	150	...	...	...	2008	2012
Nanning (Guangxi) – Guangzhou (Guangdong)	577	12.30	3.30	9.00	9.11.2008	2012
Guiyang (Guizhou) – Guilin (Guangxi) – Guangzhou (Guangdong)	857	20.00	6.00	14.00	13.10.2008	2012
Lanzhou (Gansu) – Chongqing	820	22.00	6.30	15.30	26.09.2008	2014
Nanjing (Jiangsu) – Anqing (Anhui)	258	5.30	1.30	4.00	18.12.2008	2013
Xi'an (Shaanxi) – Chengdu (Sichuan)	519	13.00	3.00	10.00	2010	2014
Chengdu (Sichuan) – Chongqing	305	2.00	56	1.04	2010	2015
Chengdu (Sichuan) – Lanzhou (Gansu)	731	17.00	4.00	13.00	22.02.2009	.12.2014

Sources: <http://english.peopledaily.com.cn/> and <http://russian.people.com.cn/> for 2001-2010

High-speed passenger railways will let to reduce the journey time for the moving people considerably economizing its personal time. So, these railways “shrink” the vast space of China, make its territorial structure more reliable and accessible for everybody.

Conclusions. Railway network of China will achieve 120,000 km by 2020, that is would increase in 1.5 times in comparison to 2008. If all mentioned projects are realized, the country would have completely different network not only by absolute size (length), but also the level of spatial complexity (circuits number, number of topological tiers in curcuital framework) and quality (network of double-tracking electrified universal magistral, network of usual single-track lines, network of high-speed passenger railways).

Different trunk lines framework will appear. Spatial structure of network will be sophisticated that improves its quality and increases its structural reliability (in the cases of rail disasters and accidents; natural disasters; strategical safety and topology), reduces the time of journey and delivery of goods. The velocity of communications will increase, so the connections between the large cities will be improved also. The most freight overloaded lines and sections will be loaded-off. The main freight overdense links between the provinces and regions will be shortened and bypass the most overloaded nodes. The unemployment problem will be dissolved partially.

The Chinese people are using the trains now more often than before the start of global economic crisis. The thing is that the level of its spatial mobility grew up due to the aggravation of this crisis. It has led to stagnation of growth rate of freight transportation from another side. Chinese railways transported 3.3 billion tonnes of goods (increase rate 4.9% in comparison to 2007) and 1.46 billion passengers (increase rate 10.9% in comparison to 2007) in 2008, and 3.32 billion tonnes of goods and 1.525 billion passengers – in 2009. The growth of transportation volumes takes place in peripheral areas (north-east, north-west, south-west), but the fall of transportation volumes – in rapidly before developing southern and south-eastern coastal areas. The number of transported passengers in 2009 increased by 10.4%. The size of freight traffic will not increase so much due to the recession of Chinese economy.

So, the global economic crisis stimulated the intensive large-scale railway construction in China, growth of passenger railway transportation and stagnation of freight railway traffic.

Bibliography

- Atlas of China. – Beijing: Sinomaps Press, 2006. – 284p.
Tarkhov S. Development of railway network in modern China// Geopolitical Studies. Vol.11: Eastern dimension of European Union. – Warsaw, 2003 (a), p.587-609
Tarkhov S. Growth of railway network in China during last 15 years (1988-2002)// Promet – Traffic – Traffico (Trieste – Zagreb). 2003 (b), vol. 14, nr.3, p. 141-159
Yonge John. China Railway Atlas. 3rd ed. – Exeter: Quail Map Company, 2008. – 64p.

http://china.notspecial.org/blogimages/china_railwayfuturemap_large.jpg

<http://english.peopledaily.com.cn/>

<http://russian.people.com.cn/>

<http://www.stats.gov.cn/tjsj/ndsj/2008/indexeh.htm>

<http://www.stats.gov.cn/tjsj/ndsj/2005/indexeh.htm>