China’s Railway Development Program and the Vision for the Future

INDIAN RAILWAYS STRATEGY WORKSHOP

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History and Growth
China’s railway: brief history

- In 1949, China had only 22,000km of poorly maintained and war-damaged railway line, less than 1000km double-tracked and non electrified;

- Since then, the government has transformed the railway sector into a vital element of China’s national transport system and a key contributor to China’s extraordinary record of economic growth;

- Today, China Rail is the second biggest carrier of rail freight and biggest carrier of passenger transport in the world;

- In aggregate, China Rail has biggest rail traffic task of any national railway system in the world.
Chinese rail network is still only about 78,000 km (2008)

2007 statistics
27,000 km double-track
25,500 km electrified
63,000 km national
9,000 km joint-venture
5,000 km local
On an area basis, the network is relatively sparse
On a per capita basis it is even less dense...
It is the busiest railway in the world ......
Since 1992, traffic on the Chinese railway network has increased by more than 110 percent, with growth of around 8 percent annually for both passenger and freight since 2000.

Source: China Statistical Yearbook 2007
Much of the traffic is long-distance – average distance travelled in 2006 was about 530 km for passengers and 760 km for freight.

Passengers and pkm

- Short-distance rail traffic has steadily declined for many years.
- This trend will be reversed with the introduction of the ‘fast regional rail’ services.
- Bulk minerals typically average 400 – 600 km haul; all general freight is well over 1000 km – the major medium-term change will be the emergence of container services as a major traffic.
PASSENGER SERVICES

- CR’s policy since 1990 of actively discouraging short-distance passengers in order to release capacity for longer-distance travel.

- The average distance traveled by passengers on the national railway system has nearly doubled, from 275 km in 1990 to 532 km in 2007.

- Strong growth in passenger-kilometers over the period since 1990.

- Strategy of CR is to meet the competitive challenge offered by road and air services by continuing to upgrade the service quality of rail passenger services.

- Shorter travel times; convenient arrival and departure times; a more comfortable travel environment; and more frequent services.

- The proportion of the fleet that is air-conditioned has increased from under 10 percent (1990) to over 60 percent in 2007.

- In 2007, EMU trains having a maximum speed of 200-250 km/h introduced.

- In 2008, EMU trains having a maximum speed of 300-350 km/h introduced.
FREIGHT SERVICES

- Although CR built several new rail corridors over the past decade, and upgraded many others through double tracking and electrification, freight capacity has remained constrained and the request for freight loading continues to exceed the 140,000 cars loaded daily in 2007.

- Almost all the growth in freight has come from coal and bulk commodities

- Of late encouraging container traffic by rail

- MOR’s priority has been to improve existing lines, and construct new ones. Current target 120 km/h speed for freight trains on mixed traffic corridors.

- Since 2005 all new wagons have been designed for a 25 tonne axle-load and 120 km/h speed.

- C80, aluminum wagon for 25t axle load with cc of 80t introduced
Strategies Implemented
BUSINESS STRATEGIES

- **Focus on Core Business:** Separated non core activities, established independent entities that compete for CR business. Non-core businesses such as construction of lines, manufacturing of locomotives and rolling stock, telecoms, track design, technical institutes, education, medical and social facilities were separated from CR. Staff reductions from 3.4 million in 1992 to 2.2 million in 2004

- **Develop World Class Competitive Passenger Services:** Included re-pricing to make these profitable, continuous improvement is service quality (shorter travel times, convenient departures/arrivals, non-stop services and air-conditioned cars) and meeting the challenge for market share from highways and air services by introducing 200 and 300 km/h speed services.
MANAGEMENT STRATEGIES

- **Implemented Asset Operation Liability System:** RAs as profit centers responsible for profitability. RAs pay a dividend to MOR on capital deployed and rent on wagons in use. RAs have freedom to pay incentives to managers for exceeding agreed targets of profitability. Emphasis on safety and in the event of a major accident incentive payment is cancelled.

- **Management restructuring:** Adopted a flatter organizational structure. In 2004 MOR took out a whole layer of management represented by the 44 divisional administrations. Management was consolidated at the level of 18 regional administrations and some 60,000 staff positions were removed. Train dispatch centers were consolidated at RA level to improve management of train operation and safety and improve operational efficiency.
LEVERAGING TECHNOLOGY

- Strong support for research and development in railway technologies by local efforts as well as through transfer of technology from established international companies. Included support for key equipment manufacturing enterprises to accelerate technological transformation and build a world-class level of railway equipment manufacturing base in China.

- Extensive use of IT for transport management information system (TMIS) that enables real time tracking and management of rolling stock and provides timely and accurate cargo tracking information for shippers and enterprises and creating the foundation for railway e-business. All wagons, passenger cars and locomotives are fitted with RFID Tags and train manifests are prepared automatically. A network wide staff e-training system also established.

- Development of 9,600-12,000 kW locomotives, high capacity (80t cc) low tare freight cars, GSM-R railway mobile communications system etc.

- Development of track, electrification and rolling stock technologies for 200 and 300 km/h speed railway systems.
FINANANCIAL STRATEGIES

- **Rail Construction Fund to develop railways**: Under the RCF scheme, a surcharge is levied on freight tariff. The proceeds are accumulated in a separate account and can be utilized for new construction of railways with the approval of the planning commission. No tax is levied on RCF.

- **New industry participants**: From 2004 Ministry of Railways has supported the establishment of new joint-venture railways aggressively that have brought in provincial governments and/or other investors as partners.
Between 1995 and 2000, staffing reduced sharply as most central ancillary businesses were divested but many small businesses (DECOs) are still operated by regional Rail Authorities.

The diagram shows the workforce (in thousands) from 1990 to 2007, with three lines representing:
- Total CR (Total Rail): Includes staff in current 19 ancillary units (containers, parcels, etc).
- Total RA: Includes staff in ancillary RA units, including DECOs.
- Total rail (excluding ancillaries): Includes staff in ancillary units (construction units, rollingstock factories etc) – many since privatised.

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REASONS FOR HIGH ASSET UTILISATION

- Larger proportion of double as well as electrified track.
- CR has adopted automatic signaling more aggressively than in India.
- High maintenance standards, low failure rates
- As a result CR operates roughly 1.5 times the number of trains on electrified double tracks than Indian Railways
- Low wagon turn round, low terminal detention
- Efficient IT based traffic and wagon management systems
Despite increasing traffic, the railways’ share of the national transport task has declined over the past 12 years, at least in part because of capacity constraints on key lines.
Declining modal share has social downside - railways in China have much lower external costs* than other modes of transport

*Includes estimates of air pollution, noise, climate change and accidents

Source: University of Leeds for MOR/WB
Key Features of Success So Far (1)

- **Commitment to long term strategy and planning:** These respond to long term needs and competitive challenges.

- **Embracing modern technologies:** Recognition that triple challenge of capacity growth, operational efficiency and service quality best attained by application of value adding railway technologies in construction, maintenance, operations and management.

- **Research and development capacity:** Impressive network of design and survey institutes, specialist universities, research institutes, laboratories and specialist agencies that enabled China to absorb international practices and develop Chinese technologies.
Key Features of Success So Far (2)

- **Project implementation capacity**: Adherence to development strategy facilitated the growth of impressive capacity for planning, detail design and construction and rolling stock design and production.

- **Organizational and management improvements**: These have contributed in delivering improvements in labour productivity, higher asset utilisation and operational efficiency.

- **Extensive use of IT**: Advanced international practices employed for example in traffic management information systems, computerized train dispatch systems, PC based staff training systems and safety systems.

- **Self financing**: Use of freight surcharge to finance new infrastructure, premium pricing for improved passenger services and JV model for investment.
VISION FOR THE FUTURE
MEDIUM AND LONG TERM PLAN

2004-2020
So China Rail and its policy-makers face two enormous challenges

- How to deliver long-term infrastructure improvements – the biggest railway development program in the world since C19th
- How the industry can adapt to become more responsive to the needs of customers in China’s socialist market economy.

The World Bank pursues a twin-track approach to this engagement, separating project delivery from policy dialogue.
Growing demand imposed on a very busy network has caused conflicting pressures in the allocation of capacity

- The Government often imposes operating priorities on China Rail, particularly allocating capacity to coal trains to keep power stations supplied at periods of high electricity need.
- There are long waiting times for freight wagons, that have some of the highest utilization rates in the world: but extra wagons would not solve the problem without extra infrastructure capacity.
- CR has so far been unable to offer high quality container rail services to inland areas, partly because of use of train paths by the bulk freights and passenger services.
- Peaks in passenger demand at holiday times require intensive operation of extra passenger services, causing temporary interruption of some freight flows.

Traffic density on the network in 2006 (measured as millions of traffic units – passenger-km plus net tonne-km – per route-km) is easily the highest in the world.
Ministry of Railways has a significant industry management role

Ministry of Railways

National railway management

18 railway authorities (RA)

5 other transport enterprises

14 non-profit organisations

Local railways

Industry management

Stations

Shareholding

80+ JVs and 3 listed railway companies

Shareholding
Three Railway Transportation Enterprises are currently listed on stock exchanges

- Daqin: listed in A-share market in August 2006 with proceeds of RMB15 billion
- Tielong: listed in A-share market in 1998 with proceeds of RMB164 million
- Guangshen: listed overseas in 1996 with proceeds of RMB4.2 billion; listed in A-share market in December 2006 with proceeds of RMB10.3 billion
Impact of Projected Economic Growth on Rail Capacity 2000-2020

- GDP will quadruple between 2000-2020 (@ 7% pa.)
- Economic structure will shift more towards tertiary industries
- Urbanization will grow and by 2020, 60 percent population will live in cities.
- Coal production will increase to 2 billion tons by 2020 to feed coal based power stations
- Petroleum demand will grow about 4% pa.
- Steel and agriculture will grow at about 1.5% pa.
- Elasticity of passenger demand with respect to GDP (over all modes) of 0.9 to 2010, reducing to 0.8 thereafter
- Rail freight demand will grow from 1600 (2003) to 3000 b tkm by 2020
- Rail passenger demand will grow from 500 (2003) to 1550 b pkm by 2020
Because of concerns that the rail system would become a bottleneck to development, the Government approved the Mid and Long-Term Development Plan (MLTDP) in 2004.

**Objectives**
- Increase capacity and overcome bottlenecks on existing high density lines
- Improve service level to passengers, including speed increase
- Connect more remote areas to the railway network
- Improve international connections (e.g. to Vietnam, Kazakhstan, Mongolia)
- Use new technologies to lower operating costs and improve environmental impact

The plan was subsequently revised in 2007 and the targets increased - in particular the funding required has approximately doubled to about Rmb 250 billion ($ 36 b) p.a.

<table>
<thead>
<tr>
<th></th>
<th>End 2007</th>
<th>MLTDP 2020</th>
<th>Current MoR plan</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>2020</td>
</tr>
<tr>
<td>Total length of track</td>
<td>77,966</td>
<td>100,000</td>
<td>120,000</td>
</tr>
<tr>
<td>Double track</td>
<td>27,031</td>
<td>50,000</td>
<td>60,000</td>
</tr>
<tr>
<td>Electrified</td>
<td>25466</td>
<td>50,000</td>
<td>72,000</td>
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<tr>
<td>Passenger dedicated lines</td>
<td>405</td>
<td>10,000</td>
<td>12,000</td>
</tr>
</tbody>
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The plan includes the development of a number of specialist networks.
The MLTDP planned network of high-speed dedicated passenger lines in 2020.

- By 2020, around 12,000 km of PDL of “four vertical and four horizontal corridors” will be built, capable of 300km/ hr operation.
- Supported by a 20,000 km network of mixed traffic lines - 200 km/ hr for passenger and 120 km/ hr for high-speed freight (e.g. containers)
- This will create a national high-speed passenger network reaching most provinces.
The three MLTDP regional intercity systems to be built:

- Three regional systems totalling 200 km.
- Some isolated lines are also proposed for other centres (e.g., Chengdu).
- These are all separate from the various urban metro schemes that are currently under consideration.
MLTDP improvements to the coal network

In 2020, top ten coal transport corridors will have an outbound transport capacity of 2 billion tons.

Main coal flows are from northern mines to the coast and then by ship to eastern and southern China.
MLTDP plans for network expansion in poorer western China

By 2020,

- 16,000 km of new lines will be constructed
- A western railway network will be created of around 40,000 km.
MLTDP proposed railway Container Network, including some double-stack lines

- Construct 18 container hubs and 40 satellite terminals.
- Upgrade existing corridors to allow 16,000 km of double-stack container transport.
- Total traffic is planned at 400 million tonnes (say 40 million TEU) by 2020, about 8 times the volume in 2003.
Investment in new infrastructure has increased by over 100% since 2004 but this effort needs to be sustained

- The original MLTDP financing scheme has been overtaken
- The current level of investment has been funded by increases in dedicated funds (mostly RCF), bonds, domestic borrowings and ‘other’
- There have been no promises from the central government of any significant contribution from the national budget
- Some foreign capital has been mobilised e.g. the container network
MOR now invests indirectly through equity in joint ventures as well as directly through the railway bureaux.

Over 70% of MOR capital construction investment is now through JVs.

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The existing institutional structure has encouraged joint ventures with provinces and other SOEs but is not likely to attract significant private risk capital.

- With some exceptions, the MOR remains the dominant owner, operator and regulator of the railway infrastructure and transport industry.

- New private investment will not be encouraged by this set-up if the investors, who can only enter the industry via MOR, also may have to compete with MOR or may present projects that MOR may prefer to allocate to its own operator (China Rail).

- Using a sporting analogy, it would be difficult to attract new teams into a football tournament if the biggest existing team also:
  - designs the playing field
  - makes the rules
  - and referees the game!!
The future success of the railway sector in China will depend on five main challenges.
The World Bank in China continues to work with Ministry of Railways and NDRC on these many challenges...

- The World Bank pursues a twin-track approach to this engagement, separating project delivery from policy dialogue

- XXX new railway projects agreed or under preparation since 2000 with combined WB lending of USD YYYYY

- Y AAA projects including topics as diverse as:
  - Specification of new traffic management information systems
  - Advice on non-traditional financing sources
  - Advice on handling multiple operators
  - Social costs of railways and other modes
  - A new integrated transport promotion law
  - Railway infrastructure investment policies in other countries
  - Market-based railway pricing policies and structures
Thank you for your attention

Questions and discussions
Chinese Socialist Market Economy

“Socialism with Chinese characteristics" is an official term for the economy of the People's Republic of China which as of 2009 consists of the state having ownership of a large fraction of the Chinese economy, while at the same time having all entities participate within a market economy. This is a form of a socialist market economy that differs from market socialism and mixed economy in that while the state retained ownership of large enterprises, it does not use this ownership to intervene to change prices which are set by the market.