What is the Future of the Chinese Railways?

By David Burns

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Not a definitive presentation!
Railways are Railways the World Over

Possible to predict future of Chinese railway by observation of those of developed countries

There are universal parameters:

- Everybody wants a car
- Many people want to be a truck driver/owner
- Trucks usually give much better service
- Water is the cheapest transport mode
- Railways are very difficult to manage, especially when it has 2 million employees
Presentation Summary

- Background
- Current Investment Policy
- Passenger Future?
- Freight Future?
- Subsidiaries - Diversified Economy Companies
- What is Future of the Railway?
Background

- 1949 Soviet Assistance (1938 Santa Fe Railway ?)
- Standards (do not question them !)
- Competing Ministries
- Seemingly inexhaustible source of capital
- Management by Objectives (so don’t trust the data)
## Basic China Railway Statistics 2006

<table>
<thead>
<tr>
<th>Category</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>total km.</td>
<td>77,084</td>
</tr>
<tr>
<td>of which</td>
<td></td>
</tr>
<tr>
<td>double track</td>
<td>26,404</td>
</tr>
<tr>
<td>electrified track</td>
<td>24,433</td>
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<tr>
<td>length of welded track km.</td>
<td>52,333</td>
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<td>hump yards</td>
<td>130</td>
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<tr>
<td>stations</td>
<td>5,576</td>
</tr>
<tr>
<td>No. Passenger (million)</td>
<td>1,257</td>
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<tr>
<td>Passenger km (billion)</td>
<td>662</td>
</tr>
<tr>
<td>average journey length (km)</td>
<td>527</td>
</tr>
<tr>
<td>Passenger train speed (km/h)</td>
<td>65</td>
</tr>
<tr>
<td>freight handled (million tons)</td>
<td>2,882</td>
</tr>
<tr>
<td>of which: coal (million tons)</td>
<td>1,120</td>
</tr>
<tr>
<td>freight ton kilometers (billion)</td>
<td>2,195</td>
</tr>
<tr>
<td>average freight journey length (km)</td>
<td>762</td>
</tr>
<tr>
<td>freight train speed (km/h)</td>
<td>32</td>
</tr>
<tr>
<td>staff productivity (000 ton-km/person)</td>
<td>1,822</td>
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<tr>
<td>total no of locos</td>
<td>17,799</td>
</tr>
<tr>
<td>of which</td>
<td></td>
</tr>
<tr>
<td>diesel locos</td>
<td>12,148</td>
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<tr>
<td>electric locos</td>
<td>5,518</td>
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<tr>
<td>other, presumably steam</td>
<td>133</td>
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<tr>
<td>total no of passenger coaches</td>
<td>42,592</td>
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<tr>
<td>total no of freight cars</td>
<td>564,899</td>
</tr>
<tr>
<td>Railway revenue approx. (billion)</td>
<td>$40.0</td>
</tr>
</tbody>
</table>
Today’s Railway

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Clearly there is a need for more railway
Waiting Rooms are not user friendly and often empty, some even have washing lines.

100 year old train control system but ‘state of the art’
Ruijin (Mao’s original HQ) Station

3 pairs of inconveniently timed passenger trains a day

Local trains lose money and interfere with long distance passenger and freight trains

And the biggest VIP chairs anywhere

1 high and 2 low level platforms, why?
Lanzhou - Chongqing railways
The Incredible Lanzhou to Chongqing Railway

- 800 km (500 miles)
- 75% in tunnels, 15% on bridges and 10% at grade or on embankments
- Double track, electrified
- 200 km/hr passenger
- 120 km/hr freight and double stack
Standards cannot be questioned so money no object
It will be quite a ride!

200 km/hr passenger trains and 120 km/hr freight and double stack

Planned Bridge deck height

29 km twin bore tunnel

14 km single bore tunnel
Cost $13 billion - about $20 million/mile

Potential problems
- 13,000 cars a day hump
- Over investment
- Will people ride it?
- Coal dust?
- Double stacks passing at 150 miles/hr in a tunnel?
- Transporting chemicals through tunnels of this length?
The first expressway was only constructed 20 years ago! Today it is 60,300 km, second only to the USA.
Construction not to US standards, but very attractive!

Where are the Trucks? They are coming

Tolls versus fuel tax

How will the Railway compete?

Who is paying for the Expressways?

A large proportion of financing is private and to be repaid by tolls, could well follow the Mexican example of bankruptcy
Railway Investment Policy
If you build it traffic will come, Field of Dreams approach

Where does the money come from?

- Construction Surcharge 80% on Freight Tariff
- China Development Bank
- Commercial Banks
- Today Provinces pay for Land and Resettlement
- International Development Banks
PASSENGERS
What is happening to the railway Passenger?

- There is increasing demand for travel
- As income increases, travel increases, but rail usage declines
- Impact of the automobile
- Impact of airplane

China is no exception, so let's look at the USA for a few pointers.
Comparison of US Miles per Capita and GDP per Capita

Travel Proportional to Income

WW II

Miles per Capita

GDP per Capita

Miles per Capita per Year

GDP per Capita
Travel increases BUT NOT BY TRAIN!!!!!
Impact of Buses

Progression
- Pick up trucks
- Mini buses
- Medium distance buses
- Long distance buses

Frequency
- Comfort
- Cost
- Revenue yield management
- Not capital intensive
- Government constructs the roads
Chinese Buses

Frequent service and low cost and large proportion look like this

And you can sleep!
Speed of Impact of Buses

- Indonesia, 2 years after introduction of mini bus, all local passenger rail passenger service GONE
- Brazil, in 10 years after expressway was constructed, almost all intercity rail service GONE
- Argentina, three levels of bus service the highest being similar to airline business class. On most passenger routes less than 3 TRAINS PER WEEK!
- USA with the construction of the expressway system and the jet airplane, most passenger trains were GONE
- Will China be any different?
Automobiles are Coming

- All countries have or are going through the same transition
- Bicycles
- Motor Cycles
- Small cars (short trips)
- Large cars (longer trips)
- Airplanes (even longer trips)
PEOPLE WANT CARS

Vehicle Penetration Follows a Pattern

Typical saturation = 550 Cars/1000 adjusted for:
- Geography (usable land area)
- Government policy
  - Consumer constraints
  - Domestic auto production
  - Infrastructure spending
  - Oil import dependency

Vehicles per 1000 people

Income per Capita (Purchasing Power Parity - 1993)

ExxonMobil
Projected China Car Ownership based on increase in per capita income (million cars)

2008 car production 6.7 million

2008 cars on the road 50 million

Based in Exxon Mobil projections
Air will have a major impact

Every major city has new airport, clearly constructed for expansion

Average growth 15% / year, and already 40% pkm of railway

New Terminal 3 in Beijing, so large there are taxis to take you to your gate if you want to pay
Highway with cars, rail market share currently 27%
Are High Speed Passenger Trains the Answer? MAY BE?????

- Japan history
- European history
- North American history

- High Speed Rail can compete against air but in most cases only if rail subsidized
- High Speed Rail can compete against automobile, only if frequent service, excellent intermodal connection, significantly lower cost
Current Rail % Market Share for Intercity Passenger Transportation

- India
- Germany
- France
- Japan
- China
- United Kingdom
- United States
- Denmark
Comparison of Population Density for USA and China

USA
East Coast
Heavily Populated
5% rail market share
Central West
0.001% rail market share
West
Increasing, but may be 3%
National Average 0.7%

China
East Coast
Heavily Populated
Possibly 20% market share
West
Little population
Possibly 2% market share
Future national market share 10% ?
WHERE WILL CHINA BE IN THE FUTURE- PASSENGERS

- No legislation against cars
- Limited number of viable corridors
- The emphasis is on speed not frequency
- Heavily subsidized
- Few long distance trains
- No commuter trains
- Few local trains to feed intercity
- Market share may be 10%
China Passenger Market

Annual Passenger km

- Other Mode Passenger km
- Rail Passenger km
FREIGHT
What is happening to railway freight

- Demand for freight a function of GDP
- As GDP/Capita increases tkm/$ GDP decreases
- Chinese GDP increasing at 10 to 12% annually
- Railway tkm increasing at about 6.5% but route length increasing at about 4%/year
What has Happened to Freight Elsewhere

(*) Pipeline and coastal transportation are not included in 1950 and 1960
Source: US data from Eno Transportation Foundation, Inc.
From 1970 to 2000 EU data from EUROSTAT
From 1959 to 1960 Europe Data from the Economic Division for Europe of United Nations
Percentage Tons and Revenue

![Graph showing percentage tons and revenue for various commodities.](image-url)
Car Must Fit the Product not the Product Fit the Car

- But CR is only now transitioning from 5 standard cars to specialized cars
- But permitted high utilization

A modern looking hopper but only 25 ton axle load
Trucking Competition - USA

Yesterday

- Drivers used to come from rural areas
- Well paid job
- Drivers liked to work on their own
- Drivers worked long hours and took drugs to stay awake

Today

- Few people left who wish to leave rural area
- Trucks tracked by GPS
- Strong restrictions on hours of driving
- Drug testing
- Deregulation
- Wages lower
- Shortage of drivers, so more use of rail
China, an almost inexhaustible supply of truck drivers

- 70% population lives in rural area
- Potential drivers happy to be away from home for long time
- Currently no GPS
- Few restrictions on drivers
- Many people would like to be truck owners
- Major highway construction program

SO HERE COMES THE TRUCK COMPETITION
Water a Major Competitor

2007 (billion)
2,380 tkm rail
4,870 tkm inter coastal
1,560 tkm river
Chinese Freight ton km Modal Shares

![Graph showing changes in Chinese freight mode shares over time]

- Railways
- Highways
- Waterways
- Aviation
- Pipelines
Comparison of China and USA

Truck and Rail Cost/tkm for various PPP ratios

Based in 1000 km

Based on 10 ton trucks

Purchasing power would indicate a $ = between 2 & 3 Y

Rail transport 3 to 4 times more expensive than USA

Based in 1000 km
Current Rail % Market Share for Freight Transportation

- India
- Germany
- France
- Japan
- China
- United Kingdom
- United States
- Denmark
Some of CR’s Freight Problems

- Must have 200,000 tons/year to get siding
- Sidings only connect into stations
- Managed by only tons and tkm objectives, not profit margin
- CR not service orientated, but some Joint Venture Railways are
- Little interest in reducing shortage of wagons
- Damage frequent but freight claims very difficult
WHERE WILL FREIGHT BE IN THE FUTURE

- Currently most is bulk with limited profit
- Marketing almost total absent
- Railway must providing logistics service
- Lower tariffs a must
- Future depends on MOR restructuring
- Cost control
- Market share could still be as low as 15%
Estimated China Rail Freight Market
(million ton km)
Diversified Economy Companies (DECOs)

- Creation started in 1986 to absorb surplus railway employees, good idea, **BUT**
- Estimated to be 23,000 companies
- Range includes orange groves, turtle farms, hotels, restaurants, bus manufacturing, freight forwarders
- DECO’s are railway management’s primary interest
- Competing with CR customers
Summary

- Railway will continue to increase route km
- Tkm and Pkm will continue to increase
- Railway planning based on distorted data
- Railway investment may have sound economic benefit, but who is paying for it?
- Railway will **not** generate the revenue to pay for investments
- The government will eventually be required to sell off DECO’s and write off debts
Major Changes are Coming

- In the near future there will be better transportation coordination, questioning of standards and hopefully more financially viable investments.

- Northwestern Transportation Center has had an influence. ‘Boosting operational efficiency in Urumqi’ July 2008 Railway Gazette.

- Some people recognize the need for change - Mao’s speech.