“We’re Falling Behind”
the Chinese National Highway System

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List of Actors

- Chinese Central Government
- Ministry of Communications (MOC)
- Environmental Protection Department
- Provincial Communications Departments (PCD)
- Foreign Investors
- Rural Farmers, Agriculture
- East Coast Citizens
- Freight Operators
- Taiwan
- Federal Highway Administration (US)
- Jim Oberstar – Chairman of the Committee on Transportation and Infrastructure
Actors (Continued)

- Ministry of Communications (MOC)
  - Public Security Departments
  - Highway Administration
  - Coordination Planning
  - Internal Cooperation
  - Institutional Reform and Legal Affairs
  - Finance
Provincial Communications Departments (PCD)

- Provincial-level governments vary greatly from each other.
- The difference between inland (west) and coastal (east) areas plays a large role.
1913
China builds first modern highway.

1949
Total road length open to traffic is 50,000 miles.

1978
Inflection point / major change — rail to cars

1979
“Open Door” or “Reform and Open” — purely planned economy to semi-planned, semi-market economy

1988
First expressway — 11.5 miles long — built near Shanghai.
1990
Major construction of expressways begins.

1996
Land Administration Law – private organizations and individuals can lease and develop state-owned land

1997
Highway Law

1998
Energy Conservation Law

1999
Highway Law Amendment (to include gas tax) – not approved

2000
Chinese Clean Air Act

2000
Number of private cars on the road is 6.25 million.

2001
10th 5-Year Plan

2003
Road Traffic Safety Law

2004
“7-9-18” Highway Plan “7-9-18 highway network”

2005
Number of private cars on the road increases to 17 million.

2006
Expressways total 25,480 miles.

2006
World Bank Transportation Strategy Update

2010
China likely to be largest market for cars

2020
China likely to be world’s leading carmaker
GUESS THE COUNTRY

(Bonus Points for the City)
China
Beijing
U.S.

New Jersey
Origins

- 1949 – China had a total of 50,000 miles of road for a country of 9,640,821 km²
- United States highway system began in 1956
- China did not have elaborate construction projects until the 1980s
Origins

- After “Open Door” or Reform and Open policy, the market became free
- Migrations of people from countryside to urban areas with job opportunities
- This shift led to rapid motorization and congestion of the existing road system
- 1980s – 28 cities population above 1 million
- 2005 – 43 cities population above 1 million
  - 24 of which population above 2 million
Origins

Figure 4 | China Passenger Travel by Mode 1980-2005 (left) and Freight Ton Travel by Mode from 1980-2005. (Wu, 2007).
Motorization Trends

- Chinese motorization trends have been growing steadily for two decades
- Automobile ownership has risen 15-20% per year
- Heavily concentrated to the wealth in cities
- Growing economy of 8-10% GDP per year has increased transport demand
Motorization Trends

- An automobile culture is born from increasing incomes
- Congestion and negative externalities reduce automotive benefits
- This drives demand for road expansion
Figure 5 | Growth of passenger transport by mode from 1900-2004. (Asian Development Bank, 2005)

Figure 6 | Growth of freight transport by mode from 1900-2004. (Asian Development Bank, 2005)
Motorization Trends

- The continual building phase since 1980s has emphasized:
  - Raising the standard of roads
  - Building trunk roads and motorways
  - Increase extent of system

- Infrastructure investments to expand the system may relieve congestion, but they also increase incentives to travel on that system
Motorization Trends

- Increased motorization combined with increase in middle class living in urban areas results in an increase in car ownership in urban areas.
- 80-100 cars per 1000 people in urban areas.
- 11 cars per 1000 people nationally.
Motorization Trends

- **Economic Development**
  - 1994 – Central government prioritized auto industry as a pillar industry
  - 2004 – Vehicle production rate 4.5 million per year
    - Fourth largest production rate
    - Third largest consumer of cars in world
Motorization Trends

- Automobile market still has to compete with traditional modes of transportation
- About 60% of trips are still made on foot or by bicycle
- Automobile culture must compete for safe travel on urban roadways with:
  - Bikes
  - Pedestrians
  - Motorcycles
  - Public Transportation
Motorization Trends

- Physical separation exists but is hard to enforce
- Congestion forces cars to park on sidewalks, drive in bike lanes, and enter pedestrian areas
- Automotive culture creates negative social externalities on other sources of transportation but is a focus of national economic development
Motorization Trends

Source: Scharenbroich, 2007
Motorization Trends

- In 1994, the central government promoted the auto industry as a “pillar industry”
  - Policy directives driving domestic demand and production of automobiles
  - China is forecasted to surpass the U.S. as the largest market for cars in 2010 and the largest carmaker in 2020
- Demand for automobiles increases as they become safer, more efficient, and less fuel consumptive
Leading Motor Vehicle Producers

Chinese Motor Vehicle Production

* Light trucks, heavy trucks and buses reported together in source, 1994-2001.

Source: Greg Baker / AP file for MSNBC.com
Environmental Issues

- World Bank Transportation Strategy
  - Goal of economic, environmental, and social sustainability

- Clean Air Act of 2000
  - Requires vehicle emission standards and prohibits import of vehicles that do not meet these standards
  - Based on the Euro II standards
Safety

- There was a 243% increase in traffic fatalities in China between 1975 and 1998.
- Increased motor vehicle use in areas designed for non-motorized transportation puts pedestrians and bicyclists at risk.
- 45% of traffic deaths in China are bikers and pedestrians.

Source: www.evworld.com
Safety

- If a pedestrian is hit by a motor vehicle, the driver bears all responsibility unless the pedestrian deliberately caused the accident.
- Drunk driving, driving without a license, and speeding over 50% above posted speed limit are faced with harsher penalties.
Safety

Relative Road Fatality Causes

China

Minnesota

- Driver Error (87.4%)
- Non-Motorized Vehicles (2.5%)
- Passengers & Pedestrians (3.7%)
- Road Conditions (0.3%)
- Mechanical Failure (4.3%)
- Others (1.8%)

- Roadway (34%)
  - Road edge dropouts
  - Intersection design
  - Other (3%)
- Vehicle (12%)
  - Too many passengers
  - Towing trailers
  - Overload and load distribution
- Driver (93%)
  - Not wearing safety belt
  - Using alcohol
  - Driving aggressively

Example—Roadways are the sole contributing factor in 3% of crashes and the roadway and driver interaction is the factor in 27% of crashes.

Source: Human Factors & Highway Safety, Elizabeth Blower
Safety

Source: motortrend.com
Discussion

- How will increased Chinese auto use change their land use and environment?
Discussion

- How does this investment create more social inequity or create an auto mobility division within Chinese society?
China

Shanghai
Funding

- Financing the highway system
  - Beneficiary-Pay System
    - Balances out taxes to fairly distribute cost
      - Direct Beneficiaries pay fares, tolls, road maintenance, and vehicle purchase fees
      - Indirect Beneficiaries pay land-related taxes
        - Charges on selling land use rights
        - Land use fees
        - Urban construction and completion fees
Funding

- Financing the highway system
  - Beneficiary-Pay System
    - Similar to US highway system with some exceptions
      - US uses gas tax
      - Chinese developers pay twice
        - Developer fees
        - Beneficiary fees
Funding

- Social Equity Issues
  - Toll pricing
    - Toll prices comparable to US and not as high as Japan
    - Comparing Toll prices as a percent of GDP per capita shows the price is the least affordable among countries compared
Figure 7 | Toll rate in China compared to other countries and the affordability of the tolls versus per capita GDP (Duncan, 2006)
Funding

- Financing the highway system
  - “Open Door” Policy (Open Reform Policy)
    - Helped bring in foreign investor partnerships
    - Paved way for private sector involvement with financing National Highway System
Funding

- **Financing the highway system**
  - **Western Development Strategy**
    - Balance the economic situation across China
    - Bring western and inland cities up to the economic pace of the eastern cities
  - **1997 Highway Law**
    - Decentralized the highway system administration
      - The PCDs plan, develop, and maintain highway network
      - MOC still regulates projects and maintenance
      - Projects between provinces planned by MOC and approved by PCDs
      - Finance partially falls to provinces
Funding

- Economic Development
  - Road Transportation Ordinance in July 2004
    - Goals of fair market competition, vehicle and operator permits, and conditions for cross-border operations
  - China spending 5% GDP for transportation
    - Most countries spend 2%
    - Intended to help economic growth by increasing connectivity
Funding

- Companies like Cheung Kong Group and New World Group (both Hong Kong based conglomerates) set up subsidiaries to invest in China’s highways
  - More than 80 public-private joint ventures were used for the National Trunk Highway System financing
- Asian Development Bank and World Bank issued loans of 1.7 billion USD to China
Funding

- Only about 10% of financing comes from foreign investment
- China established a 25% cap on the ratio of foreign investment to prevent it from growing
Funding

- Economic Development
  - Risky method of paying for highway infrastructure growth
    - Provinces undertake large loans borrowing against potential toll revenue
    - Loans paid back by tolls 70% of construction cost
    - Differences in economies between provinces make this difficult
Funding

- **Economic Development**
  - US uses “pay-as-you-go” development plan for highways
    - 90% funded by gas tax and other surcharges
    - Limits highway development by revenue raised
  - China recognizes risk in their model
    - Plans to impose higher or additional taxes on more profitable sections of the national highway system
    - These charges would subsidize the less profitable sections
Funding

- Build-operate-transfer method
  - First 25-50 years, provinces operate the tolls
  - MOC regulates the tolls, but provinces in charge of operation
  - Toll revenue used for operating costs and to pay back loans
  - Highway then transferred to public and no longer tolled
Funding

- Road user charges are levied for road maintenance fees
  - Vehicle purchase fee (10% of retail price)
  - Highway Transport Management Fee
  - Other fees levied on passenger transport and load carrying enterprises
  - Charges are easy to evade and do not always meet revenue potential

- Provinces often use this revenue on new construction
Capacity of Provinces to Raise Revenues Required for Maintenance

Source: Duncan, 2007
Discussion

- What other industries benefit from NTHS investments?
Discussion

- What kind of incentives does the investment in the NTHS provide the Chinese auto industry?
Discussion

- How will China be able to afford the continual maintenance of this system without a current gas tax?
8 Point Strategy to Complement Infrastructure

- Developed by the MOC to compliment the massive increase in expressway construction
- 1) Consolidate road transport industry, better regulatory framework
- 2) Improve quality and speed of passenger services
- 3) Raise quality and speed of freight services
- 4) Improve planning and management of freight terminals
- 5) Tighten safety management
- 6) Balance between tolls and other fees
- 7) Increase technology for efficiency and reduction of pollution
- 8) Better way of integrating policy, formation, regulation, planning, ops, and enforcement
Construction and Implementation

- Began construction on the highway project in 1998
- By 2000, 17,000 km were built
- 2 north-south routes
- 2 east-west routes
- Goal to be completed by 2020
- Finished ahead of schedule in 2007
- NTHS segments were inserted within older NHS segments, so many NHS highways were upgraded
Construction and Implementation

- First phase
  - Construction focused on east coast
  - Widened the divide in economic equity between east and west

- Second phase
  - Southwest more equally accessible
  - Not as much success in cost-benefit analysis as eastern highways
Construction and Implementation

- Phase one focused mainly on northeastern areas of the country.
- This caused a sharp increase in the differences between the travel times in the east and the west of the country.
- The first phase worsened the divide in equity between the west and the east.
Construction and Implementation

- **Social Equity Issues**
  - **Compensation**
    - The government compensates for land taken
      - Relocating villagers and assisting them with rebuilding
      - Compensating directly for land that was taken
      - Compensating for lost production on borrowed land
    - From 1999 to 2003 – 4.5 million people relocated due to highway construction
Construction and Implementation

- Phase two implemented construction in the southwest
- Travel times were shortened across the country much more evenly
- The west was always at a disadvantage because of geographical barriers
- Phase two was much more difficult and costly to implement and produced less economic return than phase one
Construction and Implementation

- Social Equity Issues
  - Western Provinces at disadvantage after decentralization
    - Less ability to acquire funding through private sector partnerships
    - Fewer resources to pay for construction and maintenance of highways and roads
The general success of the NTHS led to plans for more highways

National Expressway Network (NEN)
- “7-9-18” Highway Network
- 7 radial highways from provincial capitals
- 9 north-south routes
- 18 east-west routes
- Goal to reach > 1 billion people, especially towards the west
Construction and Implementation

- The NTHS connected cities of 500,000 people or more
- The NEN proposes to connect smaller cities with 200,000 or more
  - Enhance connectivity
  - East coast access to expressways within 30 minute travel time
  - 85,000 km of highway scheduled to be completed in 2020
Discussion

- Is the United States “falling behind” in highway expansion?
Discussion

- If and when China’s NTHS surpasses the US, how will the US compete?
Should the United States attempt to out build China? Why or why not?