Transportation Vision and Challenges for the Future – Industry Perspective

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A 50 Year Vision for Surface Transportation
Transportation Future
50 years ago

Transportation Future
50 years ago
Transportation Future
50 years ago

Transportation Future
50 years ago
"We have two classes of forecasters: Those who don’t know – and those who don’t know they don’t know”

John Kenneth Galbraith
So What Happened?

The Market Happened!

What about the future?

- Cars of the Future
  - Fuel
  - Technology
  - Footprint

- Roadways and their Evolution
  - Technology
  - Financing
  - Operations
World population will grow ~40 percent
60 percent will live in cities with more than 10 million people or more
20 percent of the population in the industrialized world will be over 65
Number of vehicles in world will increase from 730 million to ~ 1+ billion
Domestic and international marine trade will more than double
Number of airline passengers will triple and air carrier operations will double
Growth is not uniform: Market shifts are coming and will affect U.S. trade and transportation

(Country GDP Rank in Billions of Real (2003) U.S. Dollars)

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<th>Year</th>
<th>U.S.</th>
<th>Japan</th>
<th>Germany</th>
<th>U.K.</th>
<th>France</th>
<th>Italy</th>
<th>China</th>
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Source: Global Insight World Service and Goldman Sachs

Miles of New “Interstate” Quality Highways to Be Constructed, 2000-2020

China | 42,000
India | 25,000
Europe | 2,980
U.S. | 1,130

Source: The World Bank, India’s Ministry of Finance, The European Commission, and ARTBA calculations
The Competitive Challenge

CHINA

“National Transportation Highway System”: $150B investment
- 1989: 168 miles of expressway
- 2001: 10,000 miles of expressway
- 2005: 25,480 miles of expressway

12/04 announcement: “7918 Highway Network” expansion to NTHS
- Goal: 52,000 expressway miles by 2020, connect all cities with population over 200,000

China highway investment in 2001: 2.5% of GDP
(0.3% average through 1980s)
- Today: 9% of GDP

US highway investment: ~1% of GDP

The Competitive Challenge

INDIA

National Highway Development Project: $50B investment
- Improve 40,000 miles of expressway
- 1999: Enacted national gas & diesel tax; created Central Road Fund trust fund

EUROPEAN UNION

“30 Priority Axes”: 2005 European Commission identified 30 critical transnational multi-modal transportation improvement projects
- $300B investment from EU and member states
- More than 1/3 of projects ALREADY UNDERWAY

TEN-T Plan: By 2020 expanding existing road network by 2,976 miles, rail by 7,750 miles + substantial additional highway, rail and inland waterway improvements
Energy and GDP Growth Closely Linked

1970-2020

Increasing Energy - BDOE Per 1000 People

Increasing Income - $K GDP/Capita

Vehicle Penetration Follows a Pattern

Historical data through 2002

Vehicles per 1000 people

Income per Capita (Purchasing Power Parity - 1993)
Vehicle Penetration Follows a Pattern

History plus View to 2050

Saturation Level
- U.S. 890
- W. Europe 470-630
- Japan 610
- South Korea 550
- Singapore 150
- China 150
- India 140

Vehicles per 1000 people

Income per Capita (Purchasing Power Parity - 1993)

Global Transportation System

1 of 2

♦ Challenges
- Human and social costs (e.g., fatalities, injuries)
- Exploding global population and congestion
- Aging population
- Energy
- Expanding trade and tourism
- Globalization and economic competitiveness
- Environmental concerns / sustainability
- Terrorist threats
- Advanced technology
- Massive Infrastructure
Global Transportation System

Opportunities

- Eliminate transportation-related deaths, injuries and crashes
- Provide access and mobility
- Reduce travel time, cost and increase reliability of travel
- Increase throughput of people and freight regardless of weather conditions
- Eliminate environmental emissions, noise, and carbon footprint
- Enhance system security
- Advanced technology (e.g., information, nano)
Pospanamax Locks and Vessel Dimensions

**Existing Locks**
- Chamber Length: 305m (1,000')
- Max. Vessel LOA: 294.3m (965')
- TEU Capacity: 4,500

**New Locks**
- Chamber Length: 427m (1,400')
- Max. Vessel LOA: 385.8m (1,265')
- TEU Capacity: 12,600

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A.P. Moller-Maersk L Class M/S Emma Maersk
(14,000 TEU Vessel - 22 Containers Wide)

- Length: 1,302 ft
- Width: 207 ft
- Net Cargo: 123,200 tons
- Key Cranes: 10
- Engine: 14 in-line cylinders diesel engine (110,000 BHP)
- Cruise Speed: 31 m/h
- Full Crew: 13
- Construction cost: US $1+5 M

International Logistics at The Home Depot

- 2006 Sales: over $90 Billion
- 364,000 Associates
- Retail, Supply, and Direct Channels

- 95+ Countires
- >400 Factories/LOCs
- 6,000+ Import SKUs
- 2 3PLs
- 85+ Origin Ports
- 250 Terminals
- 29 Ports of Entry
  (US/CA/MEX)
- 4 US Container
  Management Companies
- 2 US Brokers
- 2 CAN Brokers
- 11 IDCs
- 2,100 Stores
- Other facilities

Managing trade risk across over 20,000 operational combinations

Example: RFID-CSD utilization by Starbucks

Starbucks Process

Monitor shipping with RFID at Coffee Mill, Guatemala

Install CSD

Arm CSD with Handheld Reader

Fixed Reader at gate of Plant in Quetzaltenango, Guatemala

Fixed Reader at gate of DC, North

Discern CSD with Handheld Reader

Mik electronic Corporation
Automated Terminal Gate Systems
The future brings combined Sensors, Data and Images

Driver passes through portal and stops at Data Entry Gate

Equipment is electronically scanned while passing through portal.

Gate operator may review images for damage while driver inputs data.
Transaction is processed and equipment is released automatically. Operator only intervenes if there are exceptions.

Driver scans Fingerprint for identification

Driver follows easy-to-use menus to enter data.

The "Smart Container": a multi-Concept/Technology case?

Danger Management Station
In case of intrusion alarm on site or cross-country

Container Security Device
RFID (CSD)
⇒ Inside of container

GPS / GSM-Modem
Mobile solution
In case of intrusion or other sensor alarm outside of site (WAN)

OCR Optical Character Recognition
Damage Inspection

Container ID (RFID-tag)

⇒ Inside of container (e.g. temperature, humidity, volume, shock)

Sensors

Within a country
Cross-country
⇒ Or / and connection to CSD

Mechanical Seal
E-seal
The Vehicle is the Sensor

Maybach 57

Vehicle location
Destination
Traffic
Speed
Road surface
Weather...
VII Can Enable a Wide Range of Applications

- Vehicle Infrastructure Integration
- Work Zone Management
- Traveler Information
- Weather Sensing
- Commercial Applications
- Intersection Collision Avoidance

...for example

VII Concept

- E-payment
- Signal Phase and Timing
- Probe Data
- Instrumented Roadside
- Real Time Network Data
- Situation Relevant Information
- Private Sector Uses
Vision for the Future

The ultimate vision for the future is the transformation of surface transportation into an effectively managed, well-integrated, universally available and affordable system.

Themes

- As a result of technological change and globalization, the mix of jobs in the U.S. is changing rapidly.
- Jobs that can be described as following a sequence of rules are disappearing, either through automation or by moving to lower-wage countries.
- Increasingly important are jobs that require expert thinking and/or complex communication.
- The problem created by technical change is not an insufficient number of jobs, but a mismatch between skill demands and skill supply, with dramatic consequences for the distribution of earnings.
Prospects for the Future

- Investment in all infrastructure areas is critical to the future of the U.S.
- Case will not be made on engineering criteria / studies
- Broader implications and economics are key (i.e., the business case)
- Stakeholders and the business community must be educated and involved
- Evaluation of system performance versus funding scenarios may help
- New financing mechanisms may be needed

Strategies

- Utilization of Existing Infrastructure
- Add Physical Infrastructure
- Increase Operating Throughput
- Corridor Approach for Investing
- Develop Agile Freight Operations
- Improve Clearance at Gateways
- Attention to Connectors
- Encourage Technology
- Integration of Information
- ITS Applications
- Increase Public Awareness
- Improve Institutional Relationships
- Improve Freight Profile
- Partnerships
“Trucks of the future will have only a man, a dog and a computer on board. The computer will be there to control the truck, the man will be there to watch the gauges, and the dog will be there to bite the man if he attempts to touch anything”

Allan Kirson, Motorola
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