THE TEXAS FREIGHT TRANSPORTATION SYSTEM 2055

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WHAT ARE WE DOING?
- Develop framework for Texas’ freight transportation system in 2055
  - List and discuss freight strategies
  - Opportunities (including critical investments)
  - Constraints that will need to be overcome
  - Future role of Texas Department of Transportation
HOW ARE WE DOING IT?
- Identify factors/trends impacting business models
- Engage/interview
  - Major Texas businesses (Fortune 500)
  - Major Mexican manufacturers
  - Major transportation service providers
Interview Major U.S. and Texas Businesses

- Envisioned freight transportation system four decades into the future
- Need to understand how technology, demographic changes, the environment, etc. impacts companies’ expectations of a future freight system in the context of:
  - Changes in sourcing patterns
  - Changes in freight destinations
  - Changes in routing patterns/modes used
  - Changes in freight volumes
  - Changes in value
Translate envisioned Texas Freight Transportation System into viable modal frameworks

- One-day workshop
- Brainstorm how alternative views of the future freight transportation system will impact Texas’ multimodal transportation system and require it to change
WHAT DO WE NEED?
- Private industry to participate in interviews
  - Understand future trends and transportation needs
- Private industry to share expectations of future freight transportation system
  - Participate in transportation roundtable
WHAT ARE THE MAJOR FACTORS/TRENDS?
• Global trade patterns
• Socio-demographic trends
• Environmental trends
• Technology trends
WHAT ARE THE MAJOR FACTORS/TRENDS?

Global Trade Patterns
Texas Exports

- Number one U.S. exporting state for 12 consecutive years (2013)
- Texas’ exports increased on average 7.9% per year (1990 to 2012)
  - Manufacturing exports increased 8.1% per year
- 40,737 companies exporting from Texas locations (2012)
- Export trade supported an estimated 1.1 million jobs (2013)

Source: U.S. Census Bureau, Foreign Trade Division
Texas’ Major Export Commodities (2013)

- Petroleum and coal products ($60.6 billion/22% of Texas’ total merchandise exports)
- Computer and electronics ($48.2 billion)
- Chemicals ($47.9 billion)
- Machinery (except electrical) ($29.9 billion)
- Transportation equipment ($24.4 billion)
Factors/Trends Impacting Texas Trade

- Free Trade Agreements (FTAs)
  - Reduce trade barriers, making it easier and cheaper for U.S. companies to export
  - 60% of Texas’ exports in 2013 were to countries participating in current FTAs
  - Trans-Pacific Partnership (TPP) and Transatlantic Trade and Investment Partnership (T-TIP) being negotiated
  - Normalization of trade relations with Cuba
Factors/Trends Impacting Texas Trade

- **Single Window**
  - International Trade Data System implemented by December 2016
  - Use single electronic platform to complete forms needed by multiple government agencies
  - Streamline exporting process and reduce clearing times

- **Supply Chain Redundancy**
  - Move away from just-in-time to redundancy in trade supply chains
  - Ensure reliability in the event of extreme weather, urban congestion, labor disputes, etc.
Factors/Trends Impacting Texas Trade

- **Nearsourcing**
  - Assign business process to foreign, lower-wage country close in distance (Mexico) to benefit from lower freight costs
  - 84% of surveyed industry executives regard nearsourcing very/somewhat important (2013)*

- **Insourcing/re-shoring**
  - Relocate business process back to the U.S.
  - 37% of surveyed industry executives prefer to locate in U.S. (2013)*

* Source: AlixPartners, 2013
Texas Trade Forecasts

- Texas trade projected to increase 211% between 2012 and 2040
- Traditional trade partners expected to remain top U.S. and Texas partners
  - Texas trade with Mexico projected to increase to almost $368 billion by 2040 (remain Texas’s major trading partner)
  - Eastern Asia trade projected to increase from $85 billion (2012) to $352 billion (2040)
- Brazil represents an important emerging market
  - For export trade with Texas, ranked 10th in 2000 and ranked 3rd in 2013

Source: FHWA FAF, 2012
WHAT ARE THE MAJOR FACTORS/TRENDS?

Socio-Demographic Trends
Socio-Demographic Trends

- Root of consumer choices; strong impact on business models

- World population
  - Estimated to increase from 7.2 billion (2013) to 9.6 billion (2050)
  - Almost 88% (8.2 billion) of world population to reside in emerging economies (2050)
    - Approximately 20% aged 15 to 59
    - Approximately 24% aged 60 or over
  - Population in developed regions expected to change marginally
    - From 1.25 billion (2013) to 1.28 billion (2050)
Socio-Demographic Trends

- United States
  - Older population (Baby Boomers) living in smaller households
  - Share of Americans living in urbanized areas is increasing
    - Half of Americans live in suburban areas
    - One-third in cities
    - Only one-sixth in rural areas

- By 2025
  - 20% of drivers will be 65 years or older
  - More elderly households in rural areas

- By 2050
  - 50% of households expected to live in single-family households
Socio-Demographic Trends

- **Texas**
  - Younger population growing faster than U.S. population
    - Higher than average birth rates
    - Net migration to the state (mainly from Mexico)
  - Houston 2013 population
    - 28% are college educated
    - Predominantly married couples with kids living in single-family units
    - Median age is 33.3 years (37 years in the U.S.)
    - Household annual income is $75,255 ($70,173 in the U.S.)
    - Unemployment rate is 10% (11 percent in the U.S.)
Socio-Demographic Trends

– Dallas 2013 population
  • 30% are college educated
  • Predominantly married couples with kids living in single-family units
  • Median age is 33.4 years (37 years in the U.S.)
  • Household annual income is $81,554 ($70,173 in the U.S.)
  • Unemployment rate is 9% (11 percent in the U.S.)

– Austin 2013 population
  • 37% are college educated
  • Predominantly married couples with kids living in single-family units
  • Median age is 33 years (37 years in the U.S.)
  • Household annual income is $80,516 ($70,173 in the U.S.)
  • Unemployment rate is 7% (11 percent in the U.S.)
WHAT ARE THE MAJOR FACTORS/TRENDS?

Environmental Trends
Environmental Trends

- Changing consumer demand
  - Demand for sustainably produced products
  - Concern about carbon footprint
    • Carbon labeling

- More stringent environmental regulations
  - Reduce criteria pollutants
  - Reduce greenhouse gas emissions
Extreme weather events present challenges for freight transportation infrastructure

- High sea levels destroy or displace ports, coastal highways, and railways
- Temperature and precipitation extremes cause premature deterioration of infrastructure
Impacts on Freight Transportation

- Green supply chains
  - Alternative fuels (biofuels, electric trucks)
  - Technologies (more fuel efficient vehicles)
- Improve efficiency of supply chain
  - Optimization of transportation routes
  - Consolidation of multiple orders
  - Intermodality (maximizing capacity)
  - Reverse logistics
Impacts on Freight Transportation

- Shift in freight transportation modes
  - Specifically truck to rail
- New urban freight transportation systems
  - Lightweight freight trams
  - Underground delivery network
- Technological innovations
  - Autonomous and driverless systems (Freight Shuttle System)
WHAT ARE THE MAJOR FACTORS/TRENDS?

Technology Trends
Technology Trends

- Current technologies that shippers and freight carriers use to manage their operations (RFID, GPS)
- Emerging technologies that have the potential to transform the supply chain (3D printing, automated vehicles)
- Technologies accessible to consumers that are reshaping demand for goods and services (e-commerce)
Current Technology Trends

- Radio Frequency Identification (RFID)
  - Contactless/wireless method of identifying objects
  - No signs of slowing down even after a decade of use
    - Global market for RFID technology expected to reach $30 billion (2024)*
    - 3.9 billion tags sold (2014) compared to 2.93 billion (2011)**

- Global Positioning System (U.S. system)
  - Navigation systems enhanced reliability and provide better visibility to freight dispatchers
    - Estimate arrival times, optimize routes, track fuel costs, and manage resources

Source: * IDTechEX, 2014; ** Das and Harrop, 2014
Emerging Technology Trends

- **3D Printing**
  - Create objects by adding (rather than subtracting) materials
  - Customization of objects (made to order products)
  - Projects will be made closer to final destination

- **Big Data**
  - Point-of-sale RFID data streams, GPS data from company fleets, call center logs, consumer blogs, online shopping habits
  - Requires analytics to unearth information
  - Initiate shipments proactively before customer places order (anticipatory logistics)
  - Many companies have yet to realize supply chain potential
Emerging Technology Trends

- Automated/self-driving trucks
  - Potential to reduce crashes, drive longer distances, and increase fuel efficiency
  - Public acceptance is a concern
  - Reduction in truck driver employment may cause political and social backlash
Electronic Commerce

- Trading of products/services using computer networks
- Choosing products/services, comparing prices, and receiving items at home
- Room to grow – penetration in the retail industry is still less than 10% globally
- Trend toward same day shipping services
- Increase requirement for last-mile, small package delivery services
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