Motor Freight Transportation

U.S. Mode Shares, 1993

Modal Profile Percent Hauled Based on Volume

Truck 52.60%
Rail 12.70%
Water 17.20%
Intermodal 1.70%
Air Freight .02%
Pipeline 10.80%
Other 5.00%


U.S. Mode Shares, 1993

Modal Profile Percent Hauled Based on Value

Truck 72.60%
Rail 4.00%
Water 3.90%
Intermodal 10.40%
Air Freight 2.40%
Pipeline 2.80%
Other 3.90%


U.S. Mode Comparison, 1993

<table>
<thead>
<tr>
<th>TRANSPORT MODE</th>
<th>% of U.S. Freight BR</th>
<th>Shipment Value ($/lb.)</th>
<th>Avg. Length of Haul (Miles)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Truck</td>
<td>19</td>
<td>$0.35</td>
<td>416**</td>
</tr>
<tr>
<td>Rail</td>
<td>8</td>
<td>$0.08</td>
<td>794</td>
</tr>
<tr>
<td>Water</td>
<td>5</td>
<td>$0.06</td>
<td>1,325</td>
</tr>
<tr>
<td>Intermodal</td>
<td>*</td>
<td>$1.01</td>
<td>***</td>
</tr>
<tr>
<td>Air Freight</td>
<td>4</td>
<td>$38.77</td>
<td>1,325</td>
</tr>
<tr>
<td>Pipeline</td>
<td>2</td>
<td>$0.09-0.09</td>
<td>84% crude, 100% refined</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>$0.20</td>
<td>unknown</td>
</tr>
</tbody>
</table>


U.S. Trucking Industry

• Exclusively serves 70% U.S. Communities
• Employees: 9.6 million
• Truck drivers: 3 million
  – Local and Over-the-Road (OTR)
• Fuel: 29 billion gallons diesel per annum
• Miles traveled: 428 billion
  – 116 billion by Class 8 vehicles


• History
  – Regulation began 1935: Interstate Commerce Commission
  – Strong railroad lobby
  – Certificated carriers for specific routes: trafficking
• Removal of barriers to entry
• Relaxed contract carriage rules
• Results
  – Route restructuring
  – Market competition and decreased prices
  – Enabling of new services: intermodal
  – Enabling of modern lean manufacturing

U.S. Trucking Industry Growth

• Increasing in importance
• Freight transport revenue share
  – 68% in 1960
  – 81% in 1997
• Continuing growth
  – Lean supply chains; just-in-time
  – Ecommerce
  – Primary beneficiaries: Parcel, LTL, Air freight
Trucking Industry Composition

**Examples: ranked by 1998 revenue**

- **Truckload firms**
  - Schneider National (3), J.B. Hunt (7), Swift (14), Werner (15)
- **Less-than-truckload firms**
  - Yellow (2), Roadway (4), Consolidated Freightways (5), Con-Way (8), ABF (9), Overnite (11), American Freightways (12)
- **Household goods firms**
  - United Van Lines (10), North American (13)

**Primary Commodities**

- **Dominant revenue producers**
  - Electronics, instruments, vehicles: $953MM, 55% share
  - Base metals and machinery: $831MM, 80% share
  - Wood products, textiles, leathers: $764MM, 76% share
  - Furniture and other manufactured products: $601MM, 77% share
  - Grains, alcohol, and tobacco: $556 MM, 93% share
  - Pharmaceutical and chemical products: $546 MM, 74% share
Export trucking

- Grown in importance with NAFTA
  - Trend: Mexican manufacturing facilities
- 20% of export freight revenue
- 11% of export tons
- Primary commodities:
  - Electronics, instruments, vehicles: $49 MM
  - Base metal and machinery: $23 MM
- Gateways: Laredo, El Paso, San Diego

Truckload operations

- Direct origin-to-destination service
  - No equipment changes
  - No intermediate terminals required
- General vs. specialized
  - Refrigerated vans (“reefers”), automobile transports, grain carriers
- Planning issues
  - Supply-demand balancing (backhauls, empty repositioning)
  - Driver issues (relays, home stays)

Less-than-Truckload (LTL) operations

- Small shipments
  - 250 to 12,000 lbs.
  - Cube (volume) is usually constraint on vehicle packing
- Hub-and-spoke networks
  - Consolidation and rerouting role of terminals
- Planning issues
  - Network design
  - Routing and scheduling problems

Equipment types in fleets

- Single-unit trucks: 68%
  - Delivery vans, tank trucks, dump trucks, cement mixers
- Tractor-semitrailer combination: 26%
  - Often, “18-wheelers”
  - Lengths (US): 40 to 53 foot
- Multi-trailer combinations: 6%
  - STAA doubles: twin 28’ trailers
  - Longer combination vehicles: Rocky Mt Doubles, Turnpike Doubles, Triples

Conventional combinations

- Conventional Combination Vehicles
  - 5-Axle Tractor Semi-Trailer
  - 6-Axle Trailer Semi-Trailers
  - STAA or “Panic” Doubles
Longer combination vehicles (LCVs)

- Single-unit: delivery vans
- Tractor semi-trailer combinations
- Multi-trailer combinations

Intermodalism

- Economics
  - Can be slower
  - Origin and destination drayage
  - Huge cost savings in driver pay
- Long-haul trips
  - 500-700 miles
  - Hub-to-hub trips in LTL and package express trucking
- TOFC vs. COFC
  - Equipment investment and management vs. price
TOFC

- Trailer-on-flatcar
- 28’ Highway trailers

TOFC train

Trends

- Value-added
  - Tracking and tracing, online quotes and service requests
- Dedicated contract carriage
  - Replacement for private carriage: outsourced
- Time-sensitive transportation
  - Expedited options: FAST
  - Time-definite delivery: RELIABLE
- 3PL Services
  - Warehousing, distribution management, handling