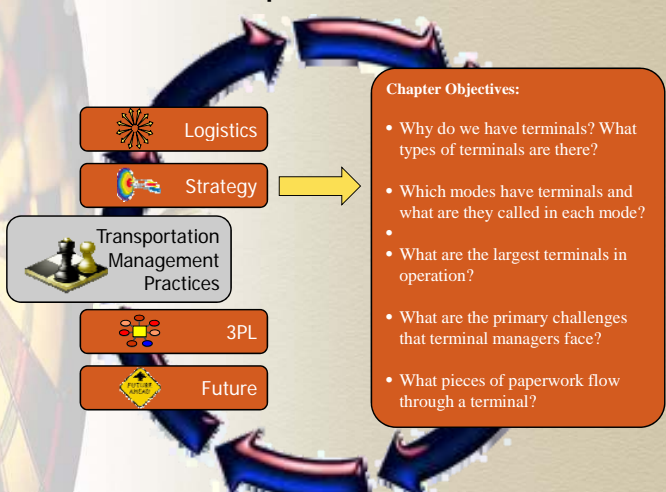


# Carrier Strategies, Operations and Terminals

Chapter 9



## Road Map to Success




The flowchart shows a sequence of five boxes: Logistics (with a starburst icon), Strategy (with a globe icon), Transportation Management Practices (with a chess knight icon), 3PL (with a network icon), and Future (with a warning sign icon). A yellow arrow points from the Strategy box to a large orange box containing Chapter Objectives.

**Chapter Objectives:**

- Why do we have terminals? What types of terminals are there?
- Which modes have terminals and what are they called in each mode?
- What are the largest terminals in operation?
- What are the primary challenges that terminal managers face?
- What pieces of paperwork flow through a terminal?

## Operating Concepts and Principles

- - travel in a straight line / avoid circuitry
  - minimize stop time
  - minimize freight handling
- - use full space capacity of equipment
  - maximize loaded miles
  - maximize equipment and labor productivity



## Operating Concepts and Principles

- Investment Utilization
  - minimize vehicle dwell time
    - use effective terminal equipment
    - maximize operational time
  - use larger equipment when volume dictates it
    - better fuel economy
    - better labor utilization
- Fuel Efficiency
  - travel at reasonable speeds
  - minimize vehicle weight



## Carrier Operating Conditions

- Performance measures
  - Service-related measures
    - Each measure impacts an aspect of shipper inventory costs
  - Examples
    - Transit time length: pickup to delivery
      - » Cycle stocks
    - Transit time consistency/reliability
      - » Safety stocks and stockout costs
    - Freight damage
      - » Safety stock and stockout costs

## Carrier Operating Conditions

- Performance measures, cont'd
  - Financial measures
    - Profitability oriented measures
      - Profit margin:  $\text{Net income}/\text{Op. revenue}$
      - Operating ratio:  $\text{Op. expense}/\text{Op. revenue}$
      - Return on assets:  $\text{Net income}/\text{Total assets}$
      - Return on equity:  $\text{Net income}/\text{Total equity}$
    - Liquidity measures: ability to meet current financial obligations
      - Current ratio:  $\text{Cur. Assets}/\text{Cur. liabilities}$
      - Acid test ratio:  $\text{Cur. Assets}-\text{Inv.}/\text{Cur. liabilities}$

## Financial Performance Measures

- Liquidity measures, cont'd
  - Working capital:  $\text{Cur. assets} - \text{cur. liabilities}$
  - Cash flow:  $\text{Net inc.} + \text{Depreciation} + \text{Def. Taxes}$
- Solvency measures: considers ability to pay principal and interest on long-term debt
  - Debt ratio:  $\text{Total liabilities}/\text{Total assets}$
  - Debt-to-equity ratio:  $\text{Total liabilities}/\text{Total equity}$ 
    - » High ratio means creditors have greater claim on than owners due
- Examples

**Table 10.1** Carrier Financial Performance Measurements

2002 Annual Data	UPS	Yellow Freight	J.B. Hunt	Norfolk Southern
<b>INCOME STATEMENT (millions)</b>				
Operating Revenue	\$31,272	\$2,624	\$2,248	\$6,270
Depreciation	\$1,464	\$79	\$146	\$529
Operating Expenses	\$27,176	\$2,577	\$2,147	\$5,112
Income from Operations	\$4,096	\$47	\$101	\$1,158
Net Income	\$3,182	(\$94)	\$52	\$460
<b>BALANCE SHEET (millions)</b>				
Inventories		\$11	\$10	\$97
Current Assets	\$8,738	\$425	\$433	\$1,299
Total Assets	\$26,357	\$1,043	\$1,319	\$19,956
Current Liabilities	\$5,555	\$450	\$325	\$1,853
Total Liabilities	\$13,902	\$683	\$728	\$13,456
Total Equities	\$12,455	\$360	\$591	\$6,500
Deferred Taxes	\$162	\$1	\$12	\$184
<b>FINANCIAL RATIOS</b>				
Profit Margin (Net Inc/Op Rev)	10.18%	-3.58%	2.31%	7.34%
Operating Ratio (Op Exp/Op Inc)	86.90%	98.21%	95.51%	81.53%
Return on Assets (Net Inc/Tot Assts)	12.07%	-9.01%	3.94%	2.31%
Return on Equity (Net Inc/Tot Equity)	25.55%	-26.11%	8.80%	7.08%
Current Ratio (Cur Assts/ Cur Liab)	1.57	0.94	1.33	0.70
Acid Test Ratio (Cur Assts-Invnt/ Cur Liab)	1.57	0.92	1.30	0.65
Debt Ratio (Tot Liab/Tot Assts)	0.53	0.65	0.55	0.67
Debt/Equity Ratio (Tot Liab/Tot Equity)	1.12	1.90	1.23	2.07
Working Capital (Cur Assts-Cur Liab) (millions)	\$3,183	(\$25)	\$108	(\$554)
Cash Flow (Net Inc + Depr + Def Tx) (millions)	\$4,808	(\$14)	\$210	\$1,173

Source: All data from individual carrier 2002 annual reports.

## Technology and Equipment

- As vehicle capacity increases
  - Vehicle capital costs rise, but at a slower rate than vehicle capacity
  - Example of economies of scale (falling average costs as scale (capacity) increases)
  - Vehicle operating costs rise, but at a slower rate than vehicle capacity
  - Example of economies of utilization (falling average costs as an existing capacity is more fully used)


## Technology and Equipment

- Route characteristics determine required vehicle power, speed and maneuverability
  - Lower horsepower tractors used for local delivery
- Match vehicle capacity to route demand and required service frequency

	Plane Carrying Capacity (Passengers)		
	50	125	450
Route Demand/Day	100	100	100
Passengers/Flight	50	100	100
Plane Load Factor	100%	80%	22%
Service (Flights/Day)	2	1	1

## Operating Strategies

- Rule of efficiency: Most efficient to move in continuous, straight line when possible
  - Minimize circuitry, sporadic movement
  - Ex. applications: unit trains
- Minimize intermediate handlings
  - Ex: run-through trains, interlined trailers, use of containers




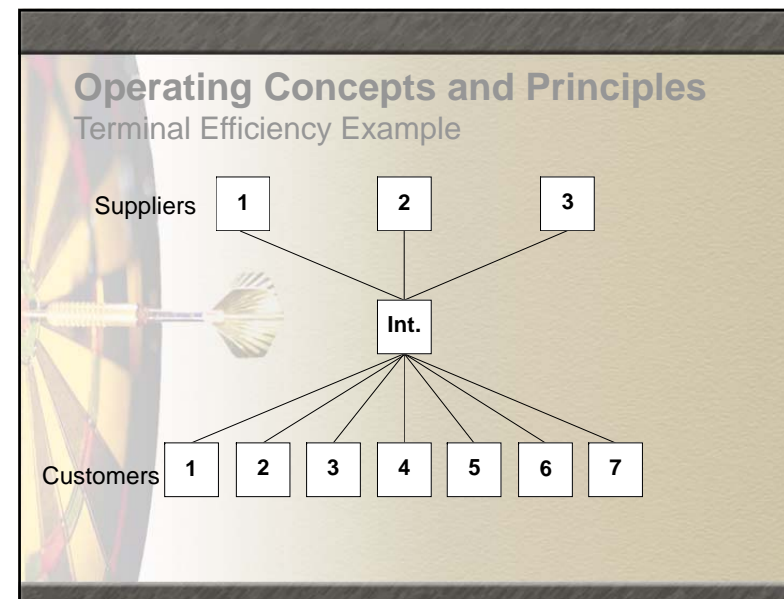
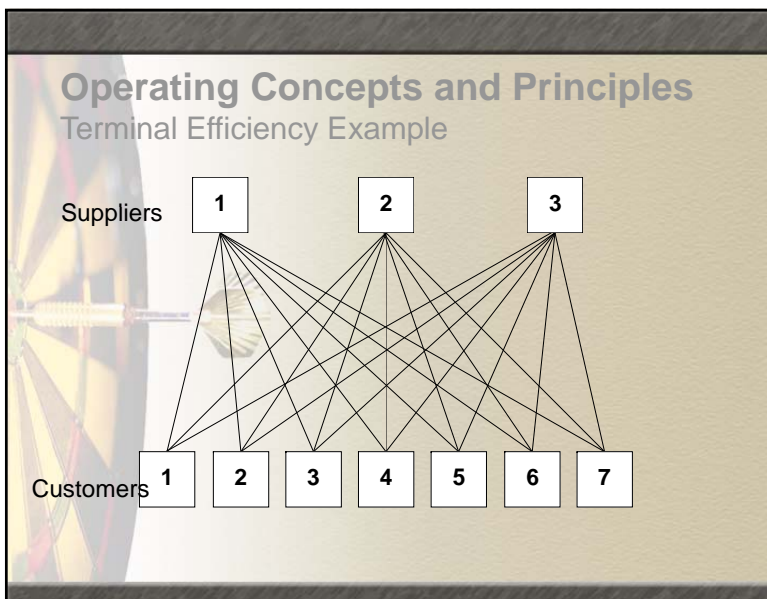
### Operating Strategies, cont'd

- Maximize capacity utilization on each run
  - Once run is scheduled, more costs are fixed w/r volume or weight carried
    - Higher utilization lowers average costs
  - Various means for improving capacity utilization
    - Delaying vehicle dispatch
    - Pricing incentives
    - Consolidation, break-bulk
    - Rerouting partially filled vehicles
    - Investing in automated loading/unloading equipment




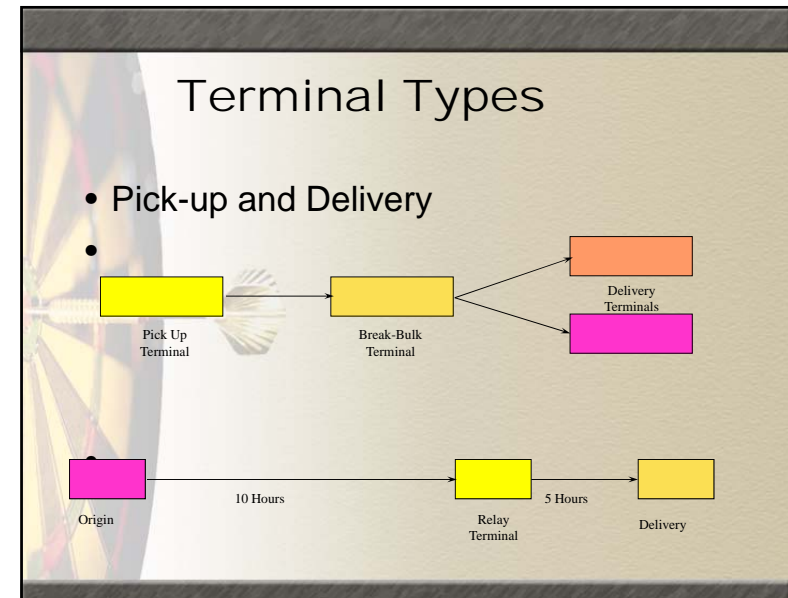
**Table 10.2** Airplane Capacity Utilization and Cost per Passenger

	Passenger Loading			
	20	30	40	50
Fixed Cost per Flight	\$8,000	\$8,000	\$8,000	\$8,000
Variable Cost	\$20	\$30	\$40	\$50
Total Cost per Flight	\$8,020	\$8,030	\$8,040	\$8,050
Cost per Passenger	\$401	\$267	\$201	\$161

## Terminal Operations

- Terminal Types
  - LTL terminals
    - breakbulk
      - regional cross-docking operations
    - satellite
      - local pickup and delivery operations
    - relay
      - layover point between breakbulk terminals
  - TL terminals
    - dispatching, maintenance and fueling point

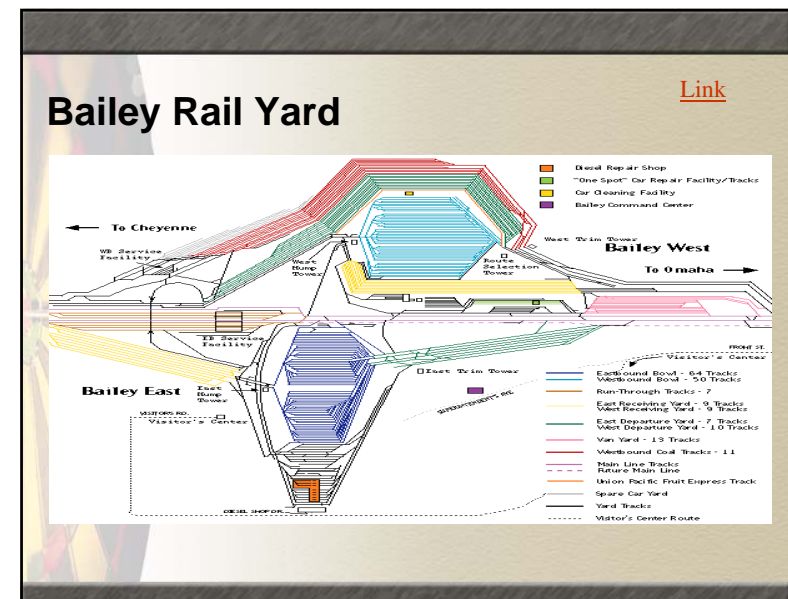



## Terminal Operations

- Terminal Types
  - Airline terminals
    - passenger terminal
    - air cargo terminals
  - Rail terminals
    - marshaling yards
      - sorting of cars by destination
    - transloading yards
      - intermodal switch of containers and bulk product



See Next Slide 



### Bailey Rail Yard

Size	Area	2850 acres
	Track	270 miles
	Switches	985
	Employees	2200
Daily Trains	Manifest	61
	Coal	52
	Grain	3
	Local	3
	Ore	3
Daily Averages	Switches Jobs	24/day
	Cars Handled - Terminal	1000
	Average Car Hours	11:30
Cars Humped	East	1500
	West	1500

### Major Air Terminals: Passenger (2008)

Source: ACI

Rank	Airport	Passengers	Change
1		90 039 280	0.7
2		69 353 876	( 9.0)
3		67 056 379	( 1.5)
4		66 754 829	( 0.2)
5	PARIS (CDG)	60 874 681	1.6
6	LOS ANGELES CA (LAX)	59 497 539	( 4.7)
7	DALLAS/FORT WORTH TX (DFW)	57 093 187	( 4.5)
8	BEIJING (PEK)	55 937 289	4.4
9	FRANKFURT (FRA)	53 467 450	( 1.3)
10	DENVER CO (DEN)	51 245 334	2.8
11	MADRID (MAD)	50 824 435	( 2.4)
12	HONG KONG (HKG)	47 857 746	1.7
13	NEW YORK NY (JFK)	47 807 816	0.2
14	AMSTERDAM (AMS)	47 430 019	( 0.8)
15	LAS VEGAS NV (LAS)	43 208 724	( 8.0)

### Major Air Terminals: Cargo (2008)


Source: ACI

Rank	Airport	Cargo (metric tons)	% Change
1	MEMPHIS TN (MEM)	3 695 438	(3.8)
2		3 660 901	(3.0)
3		2 602 916	1.7
4		2 423 717	(5.2)
5		2 339 831	(17.2)
6	PARIS (CDG)	2 280 050	(0.8)
7	FRANKFURT (FRA)	2 111 031	(2.7)
8	TOKYO (NRT)	2 100 448	(6.8)
9	LOUISVILLE KY (SDF)	1 974 276	(5.0)
10	SINGAPORE (SIN)	1 883 894	(1.8)
11	DUBAI (DXB)	1 824 992	9.4
12	MIAMI FL (MIA)	1 806 770	(6.0)
13	LOS ANGELES CA (LAX)	1 629 525	(11.9)
14	AMSTERDAM (AMS)	1 602 585	(3.0)
15	TAIPEI (TPE)	1 493 120	(7.0)

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### Terminal Operations

- Terminal Types
  - Water terminals
    - harbor
      - waterway port
      - land area for loading/unloading of ships
      - intermodal switch of containers and bulk product
  - Pipeline terminals
    - pumping stations, tanks, lines
      - storage and transport



## Key Decisions in Terminal Operations

- Number of terminals
  - distance of peddle runs
  - size & capacity of terminals
- Location of terminals
  - distance from satellites to breakbulk
  - distance between breakbulk
  - distance to primary customers
  - distance to primary highways
- Equipment types
- Equipment location



## Primary Challenges in Operations Management

- Geographic dispersion
  - labor and equipment
  - decentralization with tight control
- Front line employees
  - primary contact with customers
  - training, appearance, empowerment
- Self supervision
  - direct supervision is not possible
  - effective communication, performance measurement

## Primary Challenges in Operations Management

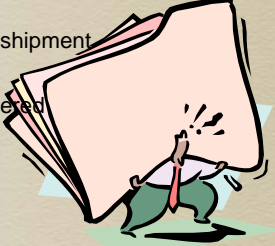
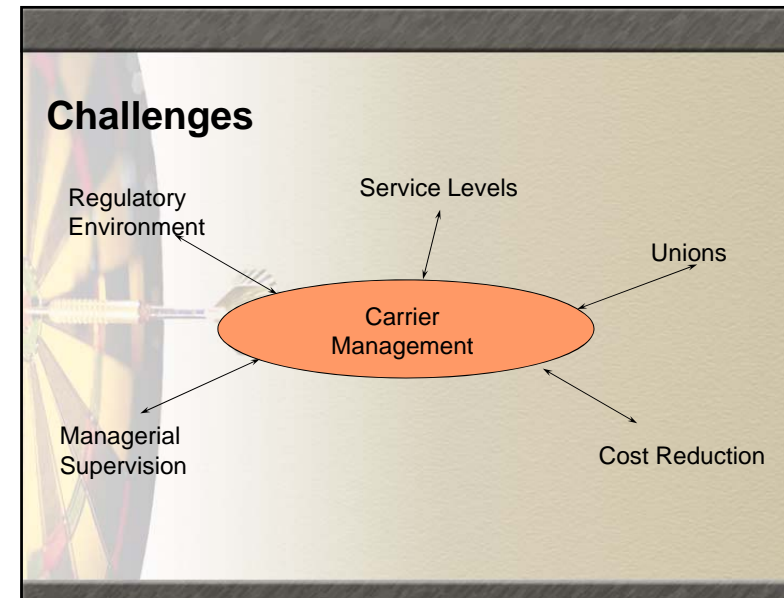
- Specialization of labor
  - inflexible system that is resistant to change
  - cross-training and changes in work rules
- Service accountability
  - local responsibility with no focus on the big picture
  - base performance evaluation on company goals
- Cost determination
  - combination of fixed, overhead, and joint costs
  - activity based costing and consistent measurement

## Primary Challenges in Operations Management

- Role as extraordinary
  - must treat freight as if you own it
  - absolutely liable for loss and damage of freight, except when unavoidable situations occur
    - Act of God
    - Act of Public Enemy
    - Act of Public Authority
    - Nature of Goods
    - Shipper Negligence
  - loss and damage "costs" often exceed the value of the goods involved in the incident

## Primary Challenges in Operations Management

- Managing the required documents
  - document that originates the shipment
  - acts a legally binding contract of carriage
  - carrier document used to control shipment
  - Freight Bill
    - carrier's invoice for services rendered
  - Delivery Receipt
    - carrier's proof of delivery
    - signed copy of freight bill

## Marketing Transportation Challenges

- Intangible service
  - strong company image is critical
- Perishable service
  - cannot inventory capacity
- Thousands of products
  - origin, destination, price, and service level
- Price determination
  - price sensitive customers
  - cost, demand, competition, backhauls

## It's a Tough Job



- Likely to be your first
  - Asst. Terminal Mgr
    - Drivers
    - Dispatchers
    - Dock Workers
    - Night Shift
- Long hours
- Bad schedules

