Certified Supply Chain Analyst

Welcome

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Certified Supply Chain Analyst

Mike Loughrin

CEO, Transformance Advisors

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Dir of Lean Programs, International Supply Chain Education Alliance

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Supply Chain Manager

Internal Consultant

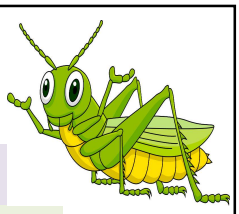
Program Manager

Consultant

Business Owner

Adjunct Professor

Board of Advisors



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WARNER HOME VIDEO

LEVI'S

Lexmark™

Cabela's
WORLD'S FOREMOST OUTFITTER®

MOUNT SOPRIS
INSTRUMENTS

Sweetheart.

4

This is your chance…

"Earning the CSCA designation was one of the best decisions I have made at CSU, it has helped greatly when it comes to applying for jobs and trying to differentiate myself in the sea of other graduates." - Doug Gaillard

"CSCA has set me apart from other candidates for jobs and internships. It shows that I am forward thinking regarding career growth and professional development." - Hannah Walcher

"Having CSCA on my resume helped me stand out from my peers and was a big part in getting my first job out of college." - Joe Kaliher

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Agenda – 9:00 AM to 2:30 PM?

1. **Review CSCA Materials**
2. **Questions and Review**
3. **Lunch and Solo Review**
4. **Exam at 12:30**

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Certified Supply Chain Analyst

Certified: officially recognize someone as possessing certain qualifications or meeting certain standards

Supply Chain: all processes and activities to provide a product or service to a final customer

Analyst: job title chosen to encompass the possible positions involved in a supply chain role for early career professionals

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CSCA Topics

- Supply Chain Overview
- Strategy
- Framework for Discussion
- Fundamental Issues
- Aggregate Planning
- Role of Inventory
- Material Requirements Planning
- Sourcing
- Purchasing
- Manufacturing
- Transportation
- Warehousing and Distribution
- Order Fulfillment
- Continuous Improvement
- Sustainability

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Supply Chain Overview

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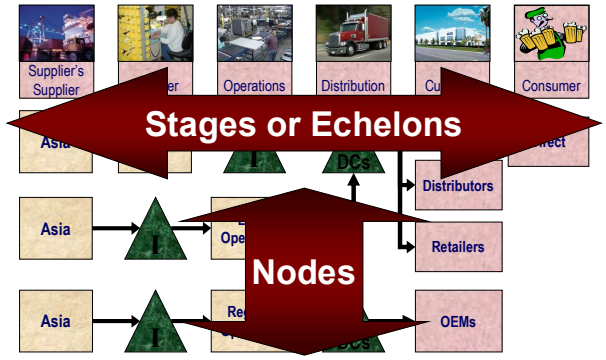
Supply Chain Networks



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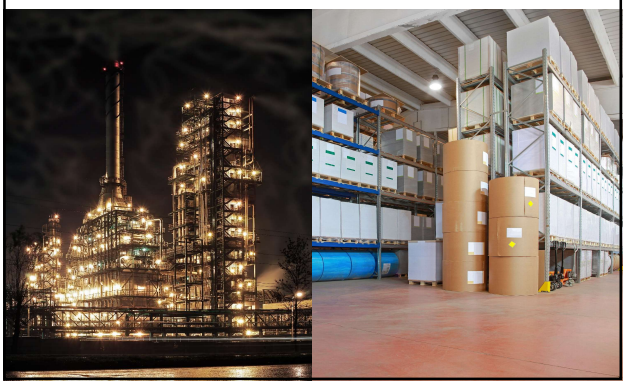
Facilities



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Value or Supply Chain Surplus

Customer is willing to pay

Costs incurred by the supply chain

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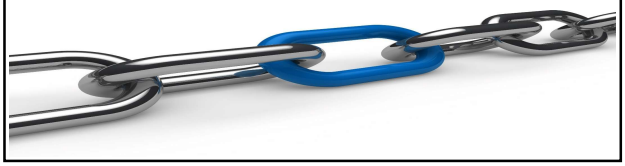
Supply Chain vs. Supply Chain

vs.



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Strategy

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Competitive Strategy

The set of customer needs that an organization seeks to satisfy through products and services

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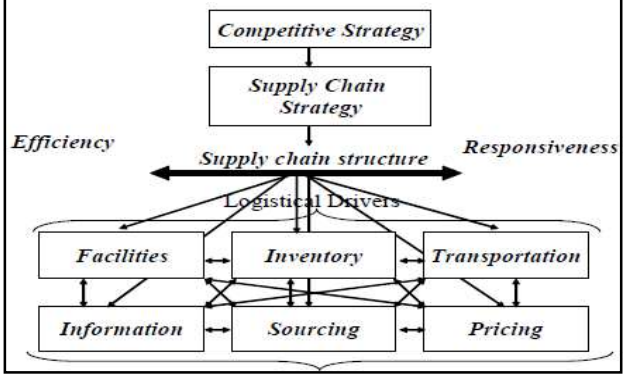
Attaining Strategic Fit



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Efficiency vs Responsiveness

Cost driven	Customer driven
Less inventory	More Inventory
Low service level	High service level
Inflexible	Flexible
Little product variety	More product variety

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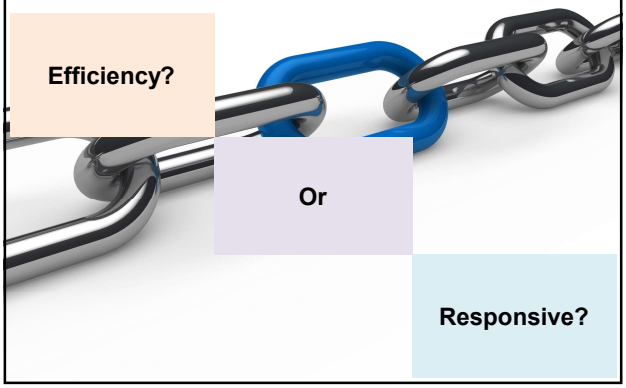
Innovative Products

Efficiency?



Or

Responsive?

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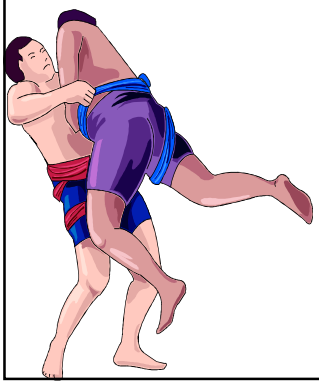
Competitive Advantage



The advantage a company has in attracting new customers away from competitors and defending against the loss of current customers to competitors

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Order Qualifiers

Characteristics which get potential customers to consider buying your products and services.

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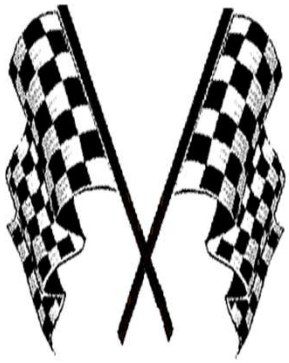
Order Winners



Characteristics which persuade customers to chose your products and services over your competitors.

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Understand Customer Needs

Satisfiers: expressed requirements

Dissatisfiers: expected requirements

Exciters/delighters: unexpected features

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Customer Needs Example

Expressed requirements = glass of water

Expected requirements = with ice

Unexpected feature = full carafe

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Loyal Customer

They spend more, refer new customers, and cost less to do business with

It costs 5+ more times to find a new customer than to keep an existing one!

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Aggregate Planning

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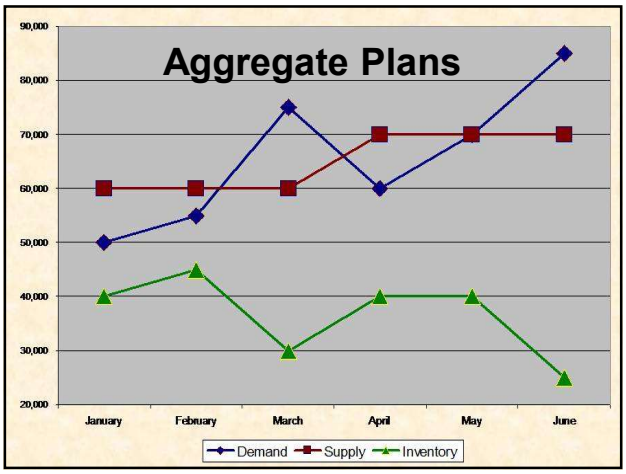

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Demand/Supply Alignment

Demand	50	75	60	80	70	65	55	45	40
Supply	50	75	60	80	70	65	55	45	40
Demand	50	75	60	80	70	65	55	45	40
Supply	60	60	60	60	60	60	60	60	60
Demand	50	75	60	80	70	65	55	45	40
Supply	70	70	70	70	70	50	50	50	50

Aggregate Planning Strategies

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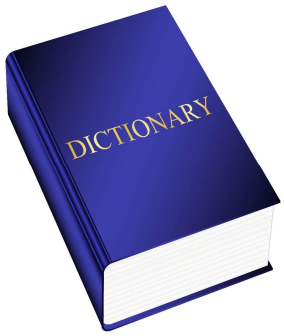
Forecasting is…

…the art and science of making projections about the future



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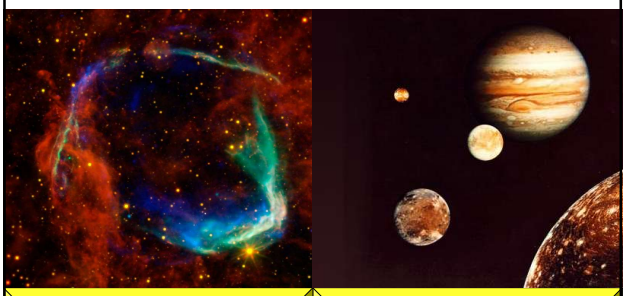
What To Forecast?



Independent | **Dependent**

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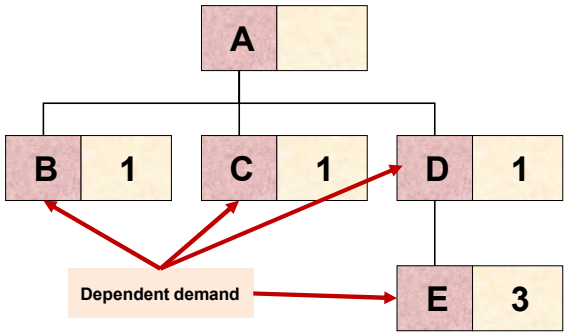
Forecast vs. Calculate



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Naïve Forecasting		3 Period Moving Average	
History	Forecast	History	Forecast
69		69	
78		78	
58		57	
	57		68
	57		68
	57		68

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Period	1	2	3	4	5	6
Actual Demand	1,500	3,000	2,000	2,500	2,000	3,000
Period	7	8	9	10	11	12
Naïve Forecast						
Forecast 1						
Moving Average (3 Periods)						
Forecast 2						

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Period	1	2	3	4	5	6
Actual Demand	1,500	3,000	2,000	2,500	2,000	3,000
Period	7	8	9	10	11	12
Naïve Forecast						
Forecast 1	3000	3000	3000	3000	3000	3000
Moving Average (3 Periods)						
Forecast 2	2500	2500	2500	2500	2500	2500

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Role of Inventory

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Types of Inventory

RM – raw materials

WIP – work in process

FG – finished goods

MRO – maintenance, repair, and operating supplies – indirect goods

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Inventory Categories

Cycle inventory: Average amount of inventory used to satisfy demand between shipments (deliveries from suppliers)

Anticipation Inventory: inventory built up to counter predictable variability in demand

Safety inventory: inventory held in case actual demand exceeds forecasts, or in case supply shortfalls occur – manage the costs of carrying too much inventory versus cost of lost sales

In-transit inventory: Goods or materials which are in the ownership of the firm but in the possession of a transportation carrier

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Safety Stock

Variation in demand and supply over lead time

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Inventory Turns

$$\frac{\text{Cost of Goods Sold}}{\text{Average Inventory}}$$

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Economic Order Quantity

$$EOQ = \sqrt{\frac{2AS}{iC}}$$

Where:

A = Annual usage in units

S = Ordering cost per order

i = Annual carrying cost as a decimal

C = Unit cost

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EOQ Example

For example, if:

A = 15,001 units

S = $40 per order

i = 35% = 0.35

C = $21.43 per unit

$$EOQ = \sqrt{\frac{2 \times 15{,}001 \times \$40}{0.35 \times \$21.43}} = 400$$

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Effect of EOQ

Balance inventory holding costs with ordering costs to minimize total costs

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Inventory Holding Cost

All the costs associated with holding inventory.

Usually defined as a yearly percentage of the value of inventory.

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Typical Elements

- ✓ Interest on money – cost of capital
- ✓ Warehouse space – all of it
- ✓ Warehouse labor – most of it
- ✓ Spoilage
- ✓ Obsolescence
- ✓ Damage
- ✓ Taxes
- ✓ Insurance
- ✓ Shrinkage
- ✓ Etc.

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Material Requirements Planning

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Material Planning

Determine the materials required

- ✓What is required
- ✓How much is required
- ✓When it is required

Establish and maintain priorities

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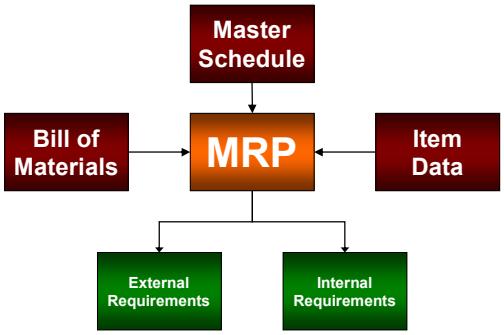
Material Requirements Planning



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Master Schedule

Period	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
*****								
~~								
+++++								
#####								
@@@								
^^^								
>>>>>								
%%%								

For most, the master production schedule is created for specific products. Newer, more flexible supply planning processes will set this at a generic model number.

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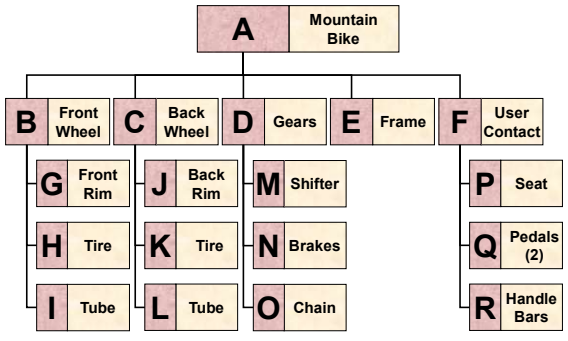
Bill of Materials Example



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Key Input = Lead Times

1. **Delivery lead time –** the time from receipt of a customer order to delivery.
2. **Production lead time –** the time from recognition of need for work order placement to availability for use.
3. **Purchase lead time –** the time from recognition of need for purchase order placement to availability for use.
4. **Cumulative lead time –** the time required to source materials, build, and have product available for customer orders. (assuming no inventory to start).

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The MRP Calculation

Opening Inventory
+
Supply (Receipt)
-
Demand (Disbursement)
=
Ending Inventory

Extremely simplified!

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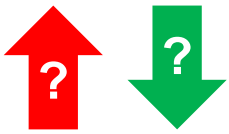
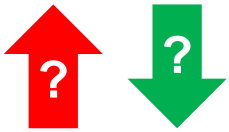
Inventory Goes…

Receipt exceeds disbursement



Disbursement exceeds receipt



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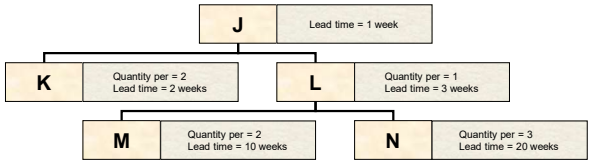
Offsetting and Exploding



Offsetting: placing the requirements in their proper time periods based on lead time.

Exploding: multiplying the parent requirements by the usage quantity through the product tree.

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Inaccuracy is Cumulative!

Forecast	Schedule	Inventory	Specifications	Resources
80%	95%	85%	95%	90%

.80 X .95 X .85 X .95 X .90 ≈ **55%**

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Sourcing and Purchasing

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Sourcing

Processes required to purchase goods and services

Critical success factor for many organizations

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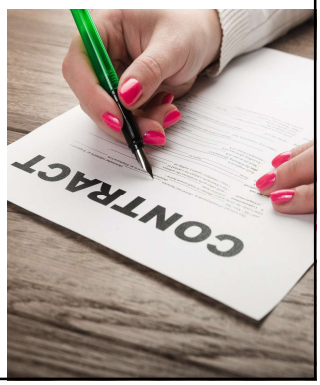
Purchase Order

Commercial document making a legal offer to buy products or services, issued by a buyer to a seller, indicating types, quantities, prices, and other terms and conditions



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Contracts and Performance

Contracts for Product Availability and Supply Chain Profits

- Buyback Contracts
- Revenue Sharing Contracts
- Quantity Flexibility Contracts

Contracts to Coordinate Supply Chain Costs

Contracts to Increase Agent Effort

Contracts to Induce Performance Improvement

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Supplier Assessment Factors

- Replenishment Lead Time
- On-Time Performance
- Supply Flexibility
- Delivery Frequency – Minimum Lot Size
- Supply Quality
- Inbound Transportation Cost
- Pricing Terms
- Information Coordination Capability
- Design Collaboration Capability
- Exchange Rates, Taxes, and Duties
- Supplier Viability

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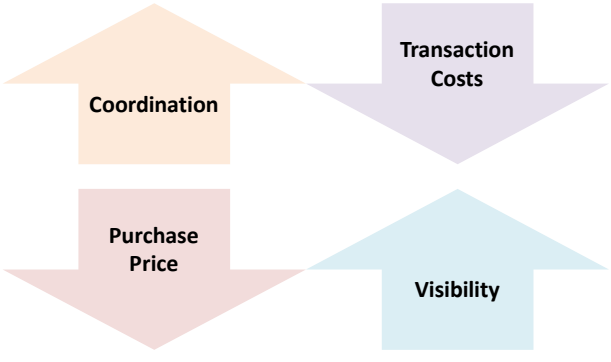
Some Goals



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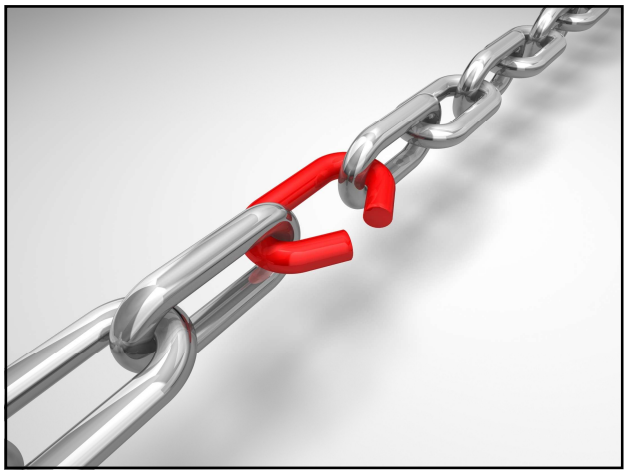

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Manufacturing

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Manufacturing Layout Strategies

- Process focus
- Repetitive focus
- Product focus

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Process Layout Strategy

- Facilities are organized around specific activities or processes
- General purpose equipment and skilled personnel
- High degree of product flexibility
- Typically high costs and low equipment utilization
- Product flows may vary considerably making planning and scheduling a challenge

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Sample Process Layouts

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Repetitive Layout Strategy

- Facilities often organized as assembly lines
- Characterized by modules with parts and assemblies made previously
- Modules may be combined for many output options
- Less flexibility than process-focused facilities but more efficient

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Sample Repetitive Layout

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Product Layout Strategy

- Facilities are organized by product
- High volume but low variety of products
- Long, continuous production runs enable efficient processes
- Typically high fixed cost but low variable cost
- Generally less skilled labor

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Sample Product Layout

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Manufacturing Technology

CNC – Computer numerical control
FMS – Flexible manufacturing systems:
- The "work machines" system
- Material handling system
- Central control computer system

CMM – Coordinate measuring machine
CAD/CAM:
- **Computer–aided design (CAD)** use of computer systems to assist in creation & design.
- **Computer-aided manufacturing (CAM) -** use of software to control machine tools and machinery.

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Transportation

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Transportation

✓ **Modes**

✓ **Stakeholders**

Move with minimal cost in terms of time, money, and environmental impact

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Modes of Transportation

U.S.A.	Billion ton miles a year	% of total	Cents per ton mile	Average haul miles
Truck	1,449	32.7	26.2	458
Rail	1,254	28.3	2.26	845
Water	733	16.5	0.74	481 to 1,251
Pipeline	753	17.0	1.46	418 to 766
Air	15	0.3	78	1,000
Multimodal	226	5.1		

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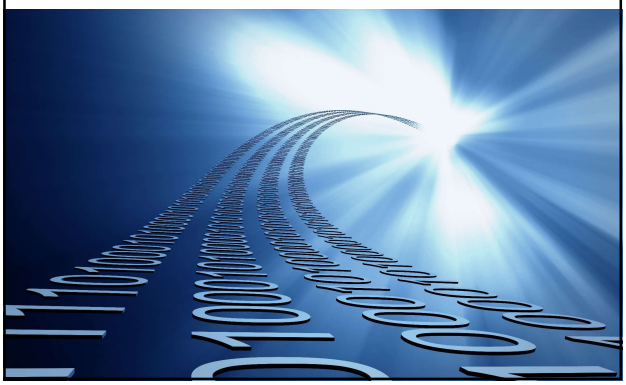
Growing Mode of Transportation



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Transportation Stakeholders

Shipper - The party that requires the movement of the product between two points in the supply chain

Carrier - The party that moves or transports the product

Policy makers - Prevent abuse of monopoly power. Promote fair competition. Balance environmental, energy, and social concerns in transportation

Infrastructure owners and operators - A public good. Monies available for maintenance and expanding capacity as needed

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Warehousing and Distribution

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Warehouse Activities

- Receive Items
- Identify Items
- Dispatch Items to Storage
- Hold Items
- Pick Items
- Assemble the Shipment
- Dispatch the Shipment
- Operate an Information System

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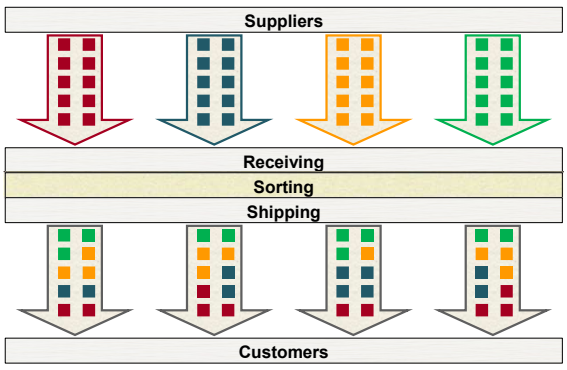
Cross Docking



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Order Fulfillment

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Order Fulfillment

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Backorder

A past due order for an item with insufficient inventory or some other problem.

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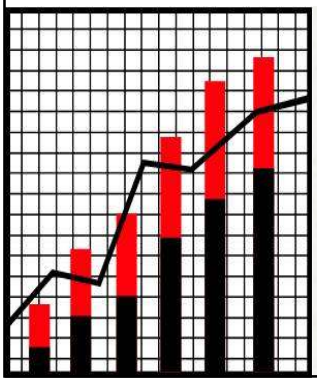
Backlog



All customer orders that have not shipped. Includes past due, current and future orders.

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Sales Order Fulfillment

- Prioritize sales orders based on customer and order information
- Assign inventory based on the priority level
- Attach and review service levels during order entry
- Assign partial order quantities based on customer service level agreements
- Automatically cancel remaining open balance quantities based on user defined fill rate rules

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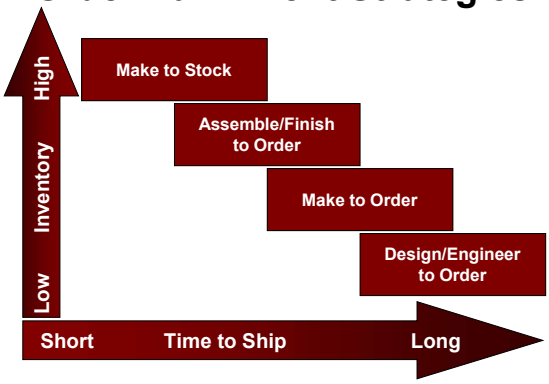
Order Fulfillment Strategies



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Cycle Service Level (CSL)

Probability of not running out of stock in any one ordering cycle

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Order Fill Rate

A measure of delivery performance to a customer usually expressed as percentage

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Quantity Shipped

Item	Quantity Ordered	Quantity Shipped
CA32	50	50
HU03	16	12
R16W	25	25
L501	25	25
POET	30	30
SLOW	1	-
LSSE	62	62
HR32	104	100
GB08	48	48
DOCK	2	2
Totals	363	354

354 Shipped

363 Ordered

97.5%

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Vendor Managed Inventory

Supplier **Customer**

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One Definition of VMI

The supplier is responsible for maintaining the customer's inventory levels.

The supplier has access to the customer's inventory data and is responsible for generating replenishment orders.

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Sustainability

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Sustainability

From a supply chain perspective, all stages of the product life cycle should be considered:

Design	**Production**
Distribution	**Destruction**

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Articles

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SCM | Bullwhip
Lean | Six Sigma

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Value Stream Mapping | Plan Do Check Act
Scatter Diagrams | Control Charts

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Video

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Pareto Analysis

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Fun Facts

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100 Questions	70%

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Questions and Review

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This is your chance…

"My boss told me that they took my CSCA accomplishment into account when hiring me; it made me look more prepared than other candidates." - Lauren Ames

"Having CSCA on my resume created a great talking point during job interview; it provided a step up on my competition!" - Michael Paratore

"Having CSCA next to my name on my resume immediately sparked conversation when I was at a job fair or in an interview; it showed that I was serious about supply chain." - Catherine Svendson

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Range of Responses

"the exam was easy"

"the hardest exam I ever took"

what will you say?

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ascm

Northern Colorado

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ISCEA

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