

### Overview

Procurement	Production	Distribution
Supplier	Manufacturer	Retailer
Transportation Activity	Manufacturing Activity	Warehousing activity

### Distribution System

Retailers

Distributor/ Warehouse

Cross Docking

Multipick- Multidrop

Internet

### Flow Management

**MTO**                      **MTS**

Low reactivity              High reactivity

Low risk/ cost              Risk of non sold product|  
Inventory cost

Long customer lead time              Zero customer lead time

### Holding inventory cost

#### Cost

Financial cost

Physical storage cost

Obsolescence cost

### Exponential Smoothing

Exponential smoothing: Example			Exponential smoothing: Example		
Month	Demand	Forecast	Month	Demand	Forecast
January	40		January	40	
February	30		February	30	
March	20		March	20	
April	30	27.33	April	30	27.33
May	31	$= 0.1 \times 30 + (1 - 0.1) \times 27.33$	May	31	27.1
June	30	27.1	June	30	$= 0.1 \times 31 + (1 - 0.1) \times 27.1$
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### Supply Chain with Single Unit

#### Supply Chain with Single Unit – Deterministic Case



$T$ : Processing time of a product in the unitchain (including loading and unloading operations)

• Cycle time:  $T_c = T$

• Capacity of the chain:  $P_c = 1/T$

### SC decision & temporal horizon

	Procurement	Production	Distribution
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Long term              Supply Chain design

Mid term              Supply chain planning

Short term              Production Planning & flow management

Very Short term              Detailed management of physical flow

### Inventory?

Economic of scale stocks

Seasonal stock

Safety Stock

Speculative stock & Merchandising stock

### Pressure of inventory

**Small inventory**              **Large inventory**

WACC              Customer Service

Storage & handling cost              Ordering cost

Insurance cost              Set up cost

Taxes              Labor or equipment utilization

Transportation cost

Payment to suppliers

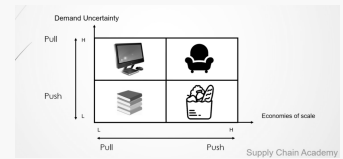
### Inventory performance measure

**Inventory performance measures (KPIs)**

- Inventory costs, already discussed
- Customer service levels
- Cycle Service Level (CSL)
  - Probability of not stock-out (Probability of non stock-out occurrence)
- Fill rate (FR)
  - Proportion of demands satisfied directly from the stock
- Example:
  - CSL = 1 - 10 / 100 = 90%
  - FR = (1400/50) / 1400 = 98.21%

Period	Order	Stock-out
1	100	0
2	75	0
3	225	45
4	140	0
5	150	0
6	200	10
7	120	0
8	160	0
9	90	0
10	40	0
<b>Total</b>	<b>1400</b>	<b>55</b>

### How to choose Push or Pull



### Push & Pull Comparison

**Push Strategy**              **Pull Strategy**

Base on Historical Data              Base on Customer Order

High level inventory & transportation cost HIGH              Make final production quick (push & pull combine)

Long time require for manufacturing process              Flexible supply in dynamic market

Target Cost reduction

### VMI, CMI, CPFR

	VMI	CMI	CPFR
Disturbance of pro order	Customer follow S	C can edit/submit orderr	Order generated jointly
Visibility	Sharing level	Storeself	
Role of customer	Information provider	Data are shared  Invisible to supplier	Joint inventory

### Other stock KPIs

- Turnover Rate (TR)
  - > It shows the speed of the renewal of the stock over a certain period
  - > Can be calculated as follows:  $TR = \text{Total Demand (over a period)} / \text{Average Stock}$
- Coverage (C)
  - > It shows the period covered on average by the stock (in months)
  - > Can be calculated as follows:  $CR = \text{Average Stock (per month)} / \text{Average Monthly Demand}$