

### 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

$$F_{t+1} = \alpha D_t + (1-\alpha) F_t$$

Month	Demand	Forecast
January	40	
February	30	
March	20	27.33
April	30	$= 0.1 \times 30 + (1-0.1) \times 27.33$
May	31	$= 37.1$
June	30	

#### Exponential smoothing: Example

$$F_{t+1} = \alpha D_t + (1-\alpha) F_t$$

Month	Demand	Forecast
January	40	
February	30	
March	20	27.33
April	30	27.33
May	31	27.1
June	30	$= 0.1 \times 31 + (1-0.1) \times 27.1$
		$= 35.49$

### 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
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

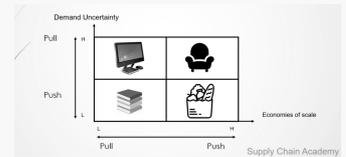
- Example:

> CSL = 1 - 10 / 100 = 90%

> FR = (140000/1450) = 96.21%

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
Total	1400	55

### 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

#### 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:  $CR = \text{Average Stock (per month)} / \text{Average Monthly Demand}$



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Published 28th June, 2022.

Last updated 27th June, 2022.

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