Production Management (ME-419)

Module 3 – Supply Management

Inventory Management
(Periodic Review, Single-Period Inventory)

Amin Kaboli

Week 12 – Session 1&2 – Nov 28th, 2025

Course Framework

Business plan
Strategic plan
Financial plan

Production Management (ME-419)

Module 1	Module 2	Module 3	Module 4	
Introduction to PM	Demand Management	Supply Management	Next-Gen Production	Final Presentation
Sep	**Sep-Oct**	**Oct-Nov**	**Dec**	**Dec 19th**
Value Adding Network Production Process Flows, Bill of materials, Production procedures, Value adding activities	Demand disruptions Forecasting Methods Qualitative methods Quantitative methods Demand plan	Supply disruptions Production Planning AP, MPS, MRP Capacity Planning Inventory Management Supply Plan	Latest trends in Production Management Orchestrating supply chain effectively From linear to circular models	Final presentation & solid understanding of the course

Learning Points

3 min

What did you learn the last week?

- Point 1
- Point 2
- Point 3
- …

Inventory Management – Decision Variables

How much to buy?

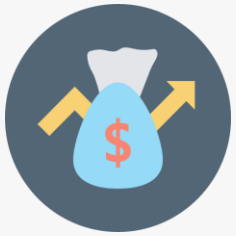
When to buy?

Order Quantity (Q)

Order Time (T)

Companies make replenishment decisions to manage inventory.

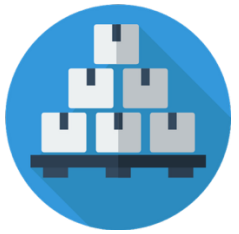
Inventory Management Models



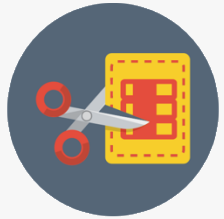
Economic Order Quantity (EOQ)

Safety Stock

Economic Production Quantity (EPQ)



Periodic Review System



Discount Model

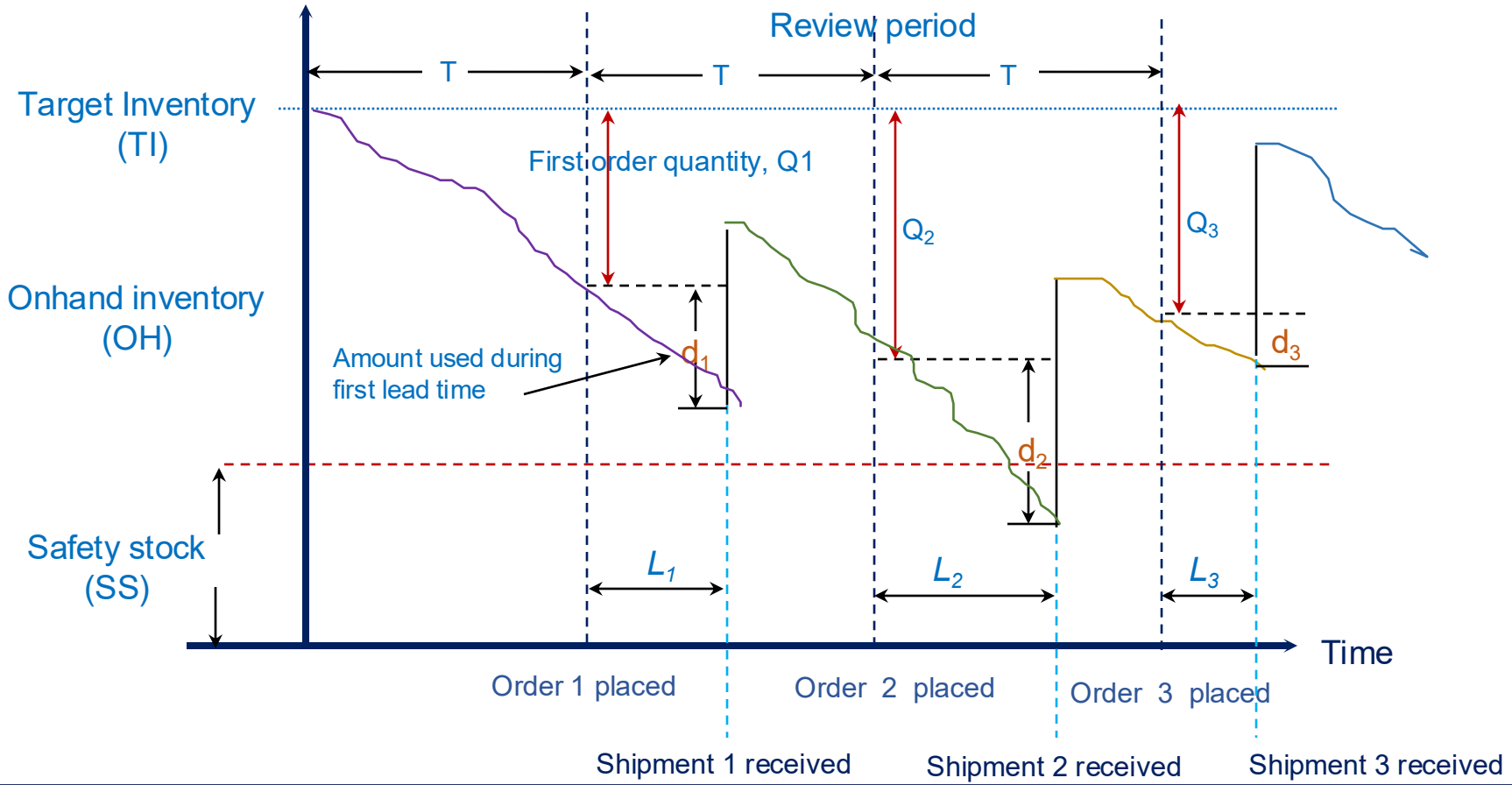
Single Period Inventory Model (Chromas Tree)

Periodic Review System

Order quantity (Q) = Target Inventory(TI) – Onhand inventory (OH)

Target Inventory (TI) = Demand rate (d) * (Review period time (RP) + Lead time (L)) + Safety Stock (SS)

SS = z $*$ Standard deviation of demand during interval T (σ_T) * $\sqrt{RP + L}$



Exercise 2: Periodic Review System

5 min

Polycare pharmacy uses a periodic review inventory system. Every Friday, the pharmacist reviews her inventory and determines the size of the replenishment order. For example, she knows that demand for 400-mg Aligifor tablets, a drug for cold, is normally distributed with a mean of 6000 tablets each week with a standard deviation of 500 tablets per week. Lead time is three weeks. The desired cycle-service level is 95 percent. There are currently no outstanding orders.

Step1: Calculate the required safety stock.
Step 2: Calculate the target inventory level.
Step 3: When she reviews her inventory of Algifor, the pharmacist finds that she currently has 19,000 tablets, calculate the appropriate replenishment order quantity.

Assignment 12: Inventory Management

10 min

Task 1: Define what you need to calculate EOQ for your case study

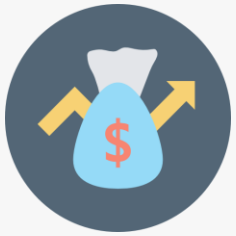
Task 2: Define what you need to calculate EPQ for your case study

Task 3: Negotiate with your supplier (coach) and build a discount model

Task 4: Define Safety Stock for your product (Finished Good)

Task 5: Implement Periodic Review model for your product (Finished Good)

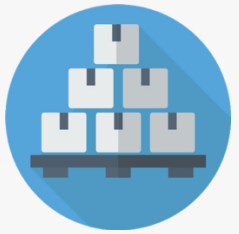
Inventory Management Models



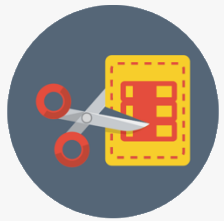
Economic Order Quantity (EOQ)

Safety Stock

Economic Production Quantity (EPQ)



Periodic Review System



Discount Model

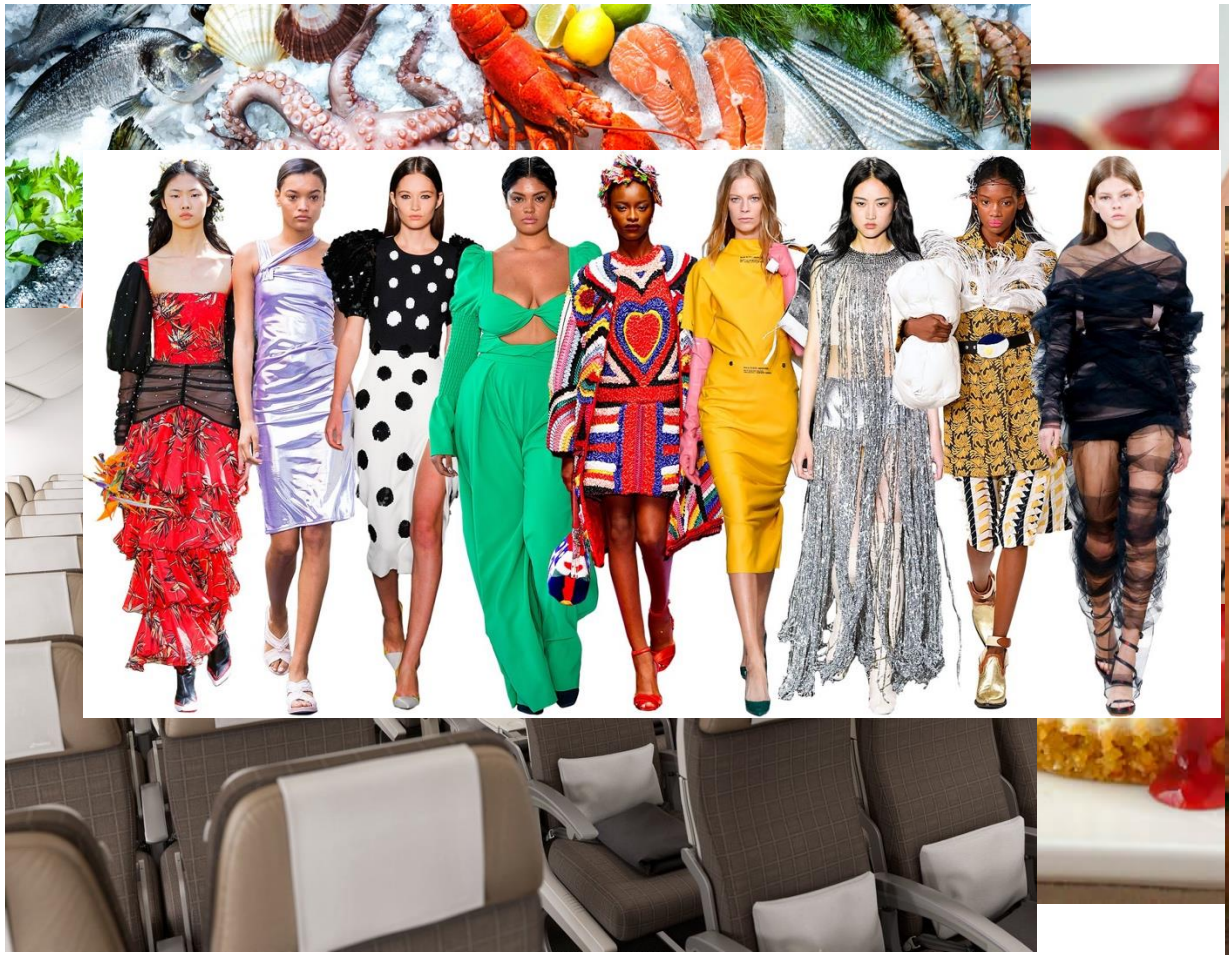
Single Period Inventory Model (Chromas Tree)

Christmas Tree

Characteristics of Products Like Christmas Tree

- Short selling season(s).
- Regular price within selling season(s).
- Lower price after selling season (since it is perishable).
- Highly variable demand but follows a known probability distribution.
- Can you name other products like Christmas tree?

Other short-selling-seasonal products



The Single Period Inventory Model

- Restaurants
- Fashion
- Publishing companies (magazines, …)
- High tech
- Online sales
- Entertainments
- …







Characteristics of Products Like Christmas Tree

- Short selling season(s).
- Regular price within selling season(s).
- Lower price after selling season (since it is perishable).
- Highly variable demand but follows a known probability distribution.
- How to model it?

The Single Period Inventory Model

Two costs are associated:

1) Shortage cost (C_s): when Demand (D) > the quantity (Q); OR Too little product

2) Excess cost (C_e): when Demand (D) < the quantity (Q); OR too much product

$$\text{Service level} = \frac{Cs}{Cs + Ce}$$

Procedure - The Single Period Inventory Model

1) Define Shortage costs (C_s which is Revenue (per unit) – Cost (per unit))

2) Define Excess costs (C_e which is Cost (per unit) – Salvage value (per unit))

3) Determine Service level (which is = $\frac{Cs}{Cs + Ce}$).

4) Determine the associated *z* value (for normal distribution: NORMSINV (Service level)).

5) Determine Q, which is **Q =** D + $z\sigma$

Exercise 3: Determine Optimal Croissants Quantity for Arcadie at EPFL

7 min

Croissants are delivered daily to Arcadie. Demand varies between 50 to 70 croissants per day. Arcadie pays 50 cents CHF per croissant and charges 2 CHF for each croissant. Unsold croissants have no salvage value and can not be sold the next day. What is the optimal order (stocking level) for Arcadie, Given that the distribution function is uniform, and normal (Mean:60, SD: 5)?

Reminder: Q = D + $z\sigma$

Solution1: Determine Optimal Croissants Quantity for Arcadie at EPFL

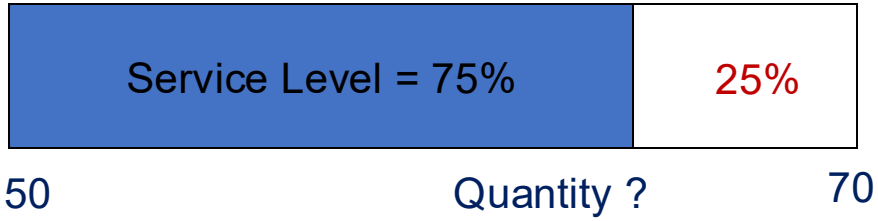
Croissants are delivered daily to Arcadie. Demand varies between 50 to 70 croissants per day. Arcadie pays 50 cents CHF per croissant and charges 2 CHF for each croissant. Unsold croissants have no salvage value and can not be sold the next day. What is the optimal order (stocking level) for Arcadie, Given that the distribution function is uniform, and normal (Mean:60, SD: 5)?

1) **C_s =** 2 – 0.5 = 1.5 CHF

2) **C_e =** 0.5 – 0 = 0.5 CHF

3) **Service level =** 1.5 / (1.5 + 0.5) = 75%

4) Uniform distribution:
   Stock out = 1 – Service level = 25%
   Q = Min + Service level * (Max – Min)
   Q = 50 + 75% * 20 = 65



Solution 2: Determine Optimal Croissants Quantity for Arcadie at EPFL

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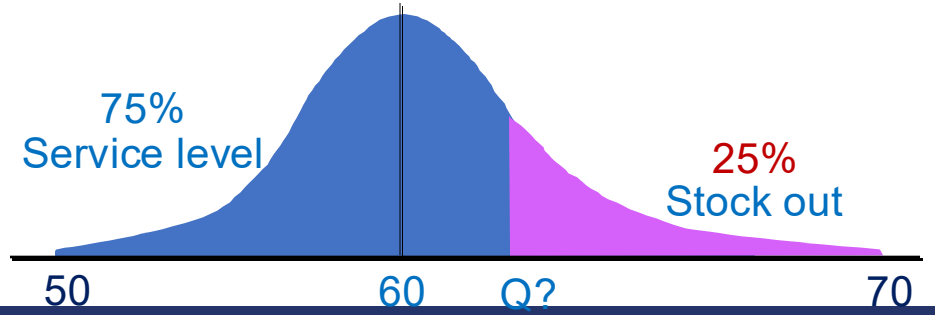
3) **Service level =** 1.5 / (1.5 + 0.5) = 75%

4) Normal distribution:
   $Q = D + z\,\sigma$
   $Q = 60 + 0.6744 * 5 = 60 + 3.372 = 64$



Assignment 12: Inventory Management

10 min

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Task 5: Implement Periodic Review model for your product (Finished Good)

Task 6: Propose a promotion plan for your product, implement the single inventory model and justify your proposal. If promotion does not make sense for your product, justify why?

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Coaching Rooms

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Week 12 – Session 4 – Nov 28th, 2025

The Art of Giving and Receiving Effective Feedback

Feedback is a gift

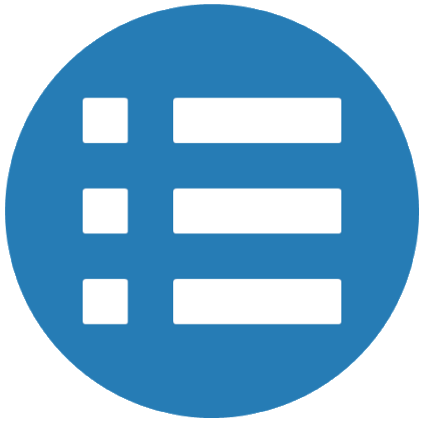
Feedback/comments are always welcome

Giving Effective Feedback

Respectful

Ask for permission

May I share my observation



Fact-based

Share facts/ your feelings

What I observed/felt is that …

Constructive

Stay focused on growth

What I suggest is that …

Concise

Be to-the-point and short

Max three key points

Open

Be open to any reaction

I respect your feeling …

Receiving Effective Feedback

Receive the gift

Be open and receptive

I appreciate your feedback

Listen

Listen to listen!

The goal is to listen not to answer, no interruption (zip it)

Understand

Focus on THE message

The goal is to understand, ask questions, clarify, repeat key points, …

Decide

You always have a choice

Thank you, I have never seen it this way

OR

Thank you, let me reflect and get back to you?

Follow up

Reach a common understanding

There are many ways to follow up: revise the work, set up a meeting, …