

Production Management (ME-419)

Guest Speaker

Week 12 – Session 1 – Nov 29th, 2024

Production Management (ME-419)

Module 3 – Supply Management **Inventory Management (EPQ, Discount, SS)**

Amin Kaboli

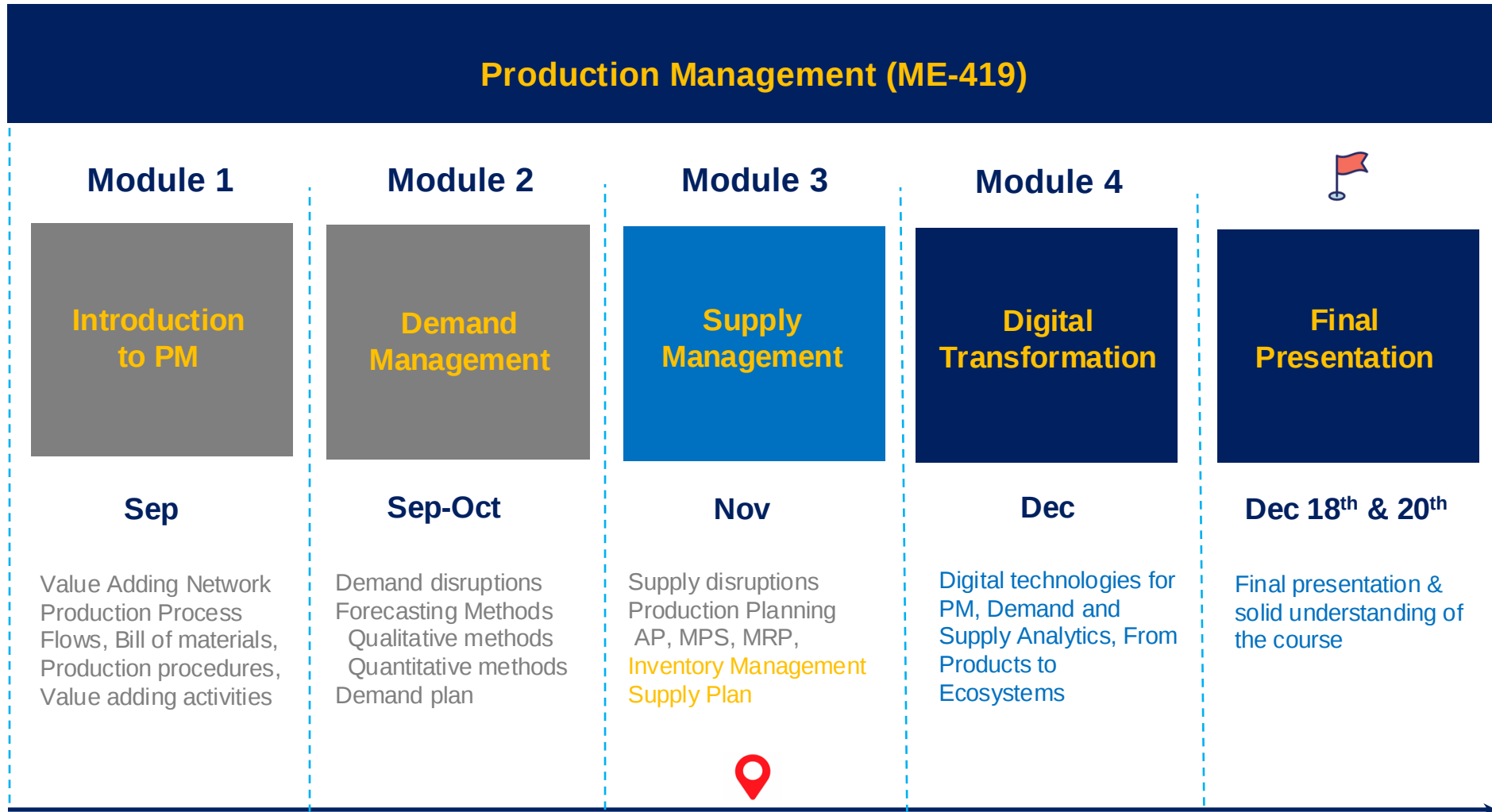
Week 12 – Session 2 – Nov 29th, 2024

Course Framework



Business plan

Strategic plan
Financial plan



Inventory Management – Decision Variables

How much to buy?



Order Quantity (Q)

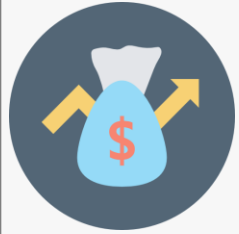
When to buy?



Order Time (T)

Companies make replenishment decisions to manage inventory.

Inventory Management Models



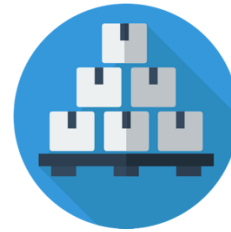
Economic Order Quantity (EOQ)



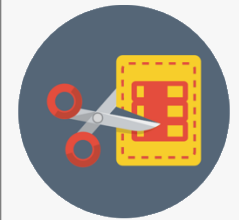
Safety Stock



Economic Production Quantity (EPQ)



Periodic Review System



Discount Model



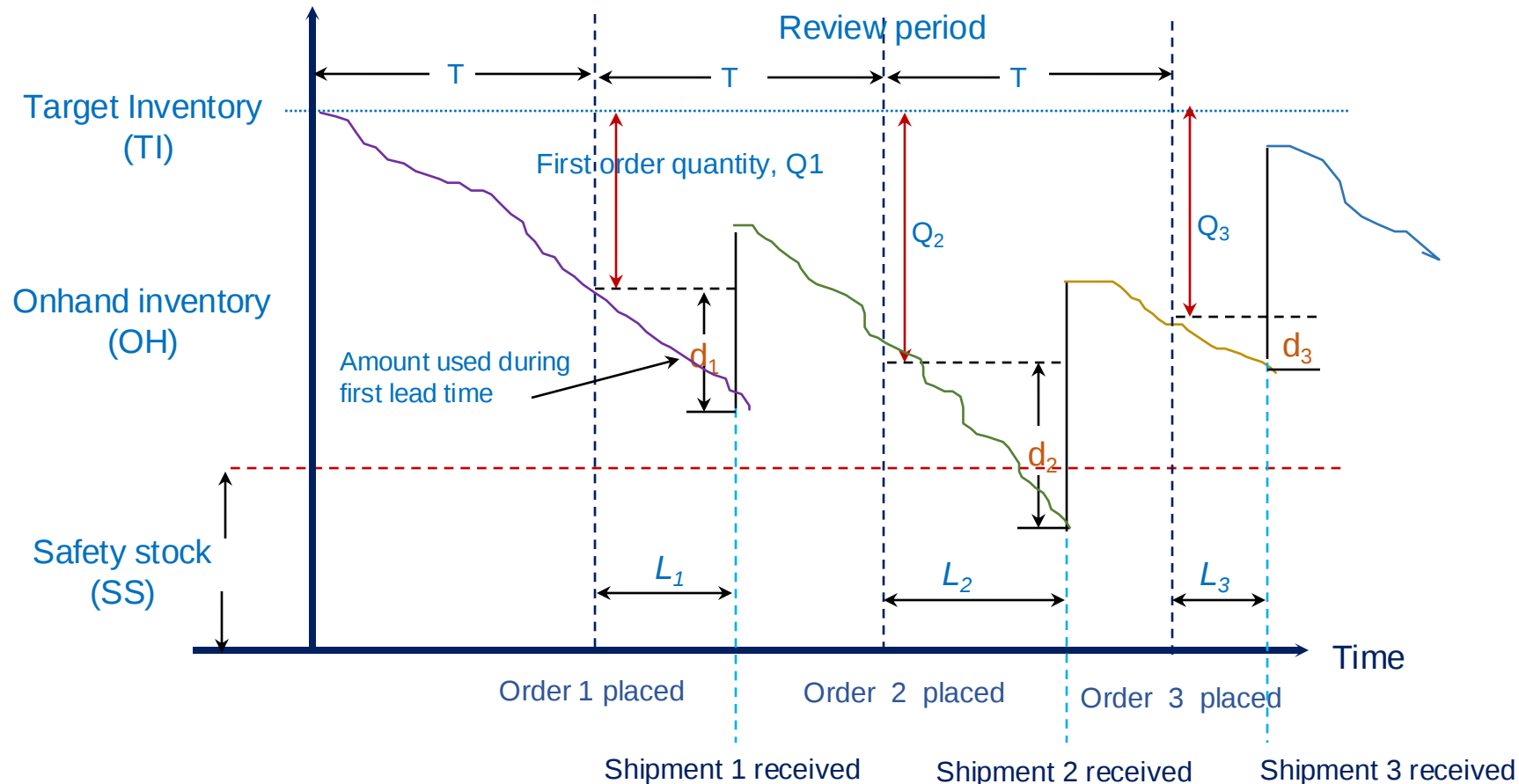
Single Period Inventory Model
(Chromas Tree)

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



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

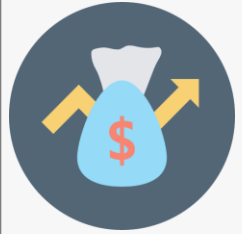
Task 2: Define what you need to calculate EPQ for your case study

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



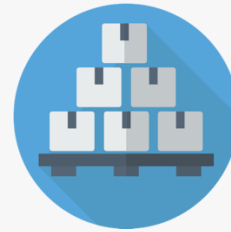
Economic Order Quantity (EOQ)



Safety Stock



Economic Production Quantity (EPQ)



Periodic Review System



Discount Model



Single Period Inventory Model
(Chromas Tree)

Christmas Tree

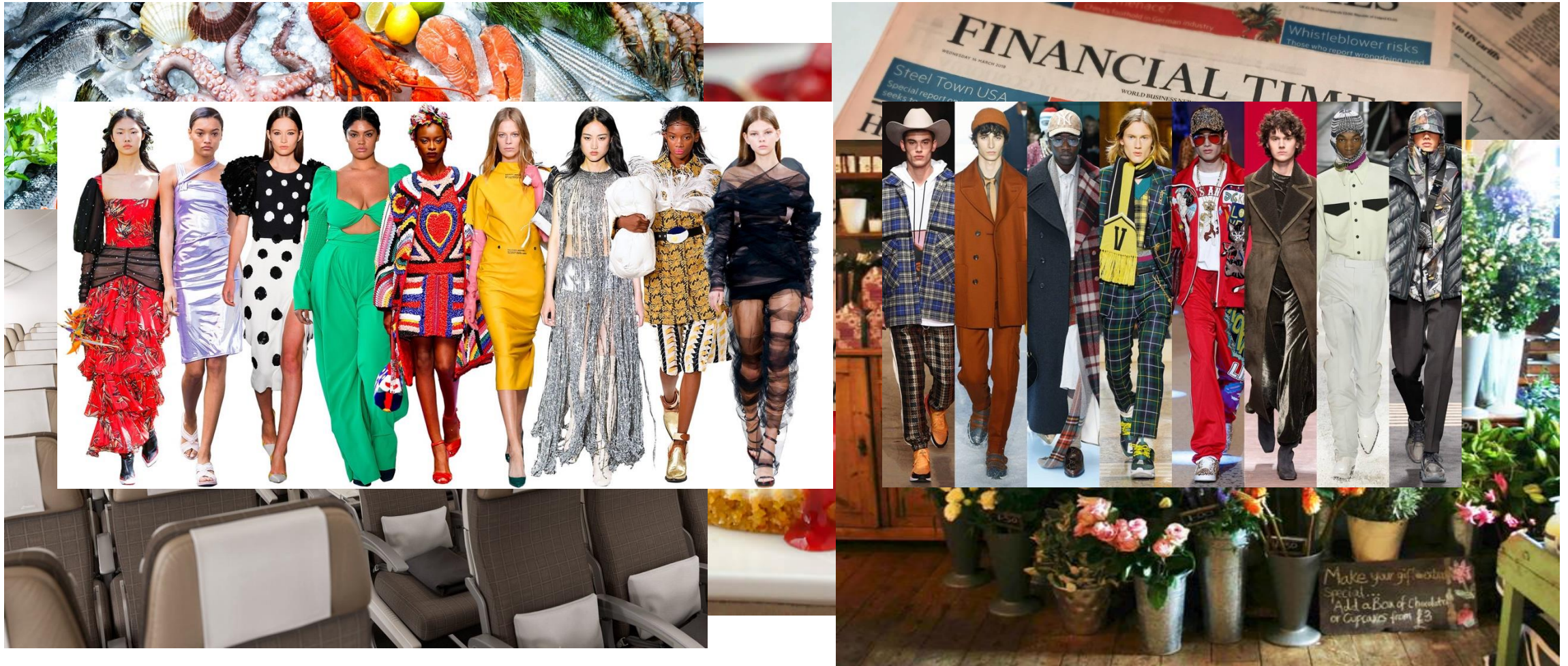


Characteristics of Products Like Christmas Tree

- 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

$$\text{Service level} = \frac{C_s}{C_s + C_e}$$

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 $= \frac{C_s}{C_s + C_e}$).
- 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) $C_s = 2 - 0.5 = 1.5 \text{ CHF}$

2) $C_e = 0.5 - 0 = 0.5 \text{ CHF}$

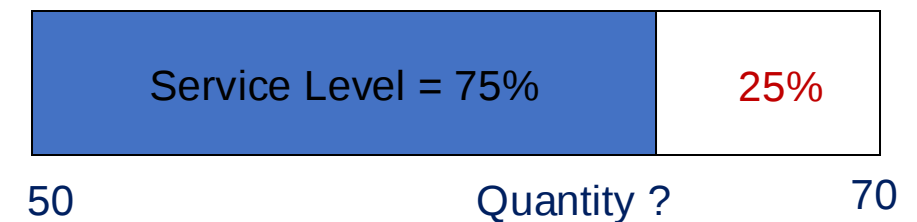
3) $\text{Service level} = 1.5 / (1.5 + 0.5) = 75\%$

4) Uniform distribution:

$$\text{Stock out} = 1 - \text{Service level} = 25\%$$

$$Q = \text{Min} + \text{Service level} * (\text{Max} - \text{Min})$$

$$Q = 50 + 75\% * 20 = 65$$



Solution 2: 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)?

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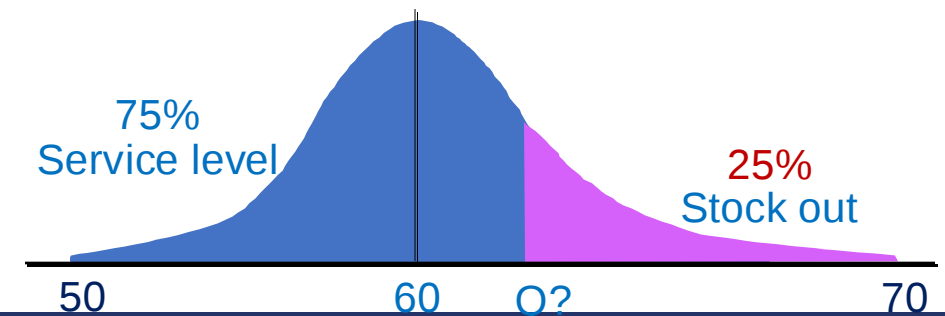
2) $C_e = 0.5 - 0 = 0.5 \text{ CHF}$

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

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)

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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Guest Speaker

Week 12 – Session 3 – Nov 29th, 2024

Production Management (ME-419)

Coaching Rooms

Amin Kaboli

Week 12 – Session 4 – Nov 29th, 2024

Please Follow Your coaches to Your Designated Rooms

Coaches



Joao
GCA 331



Xavier
GRA 332

The Art of Giving and Receiving Effective Feedback



Feedback is a gift



Feedback/comments are
always welcome

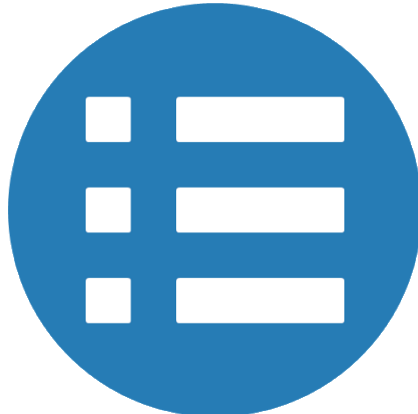
Giving Effective Feedback



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, ...