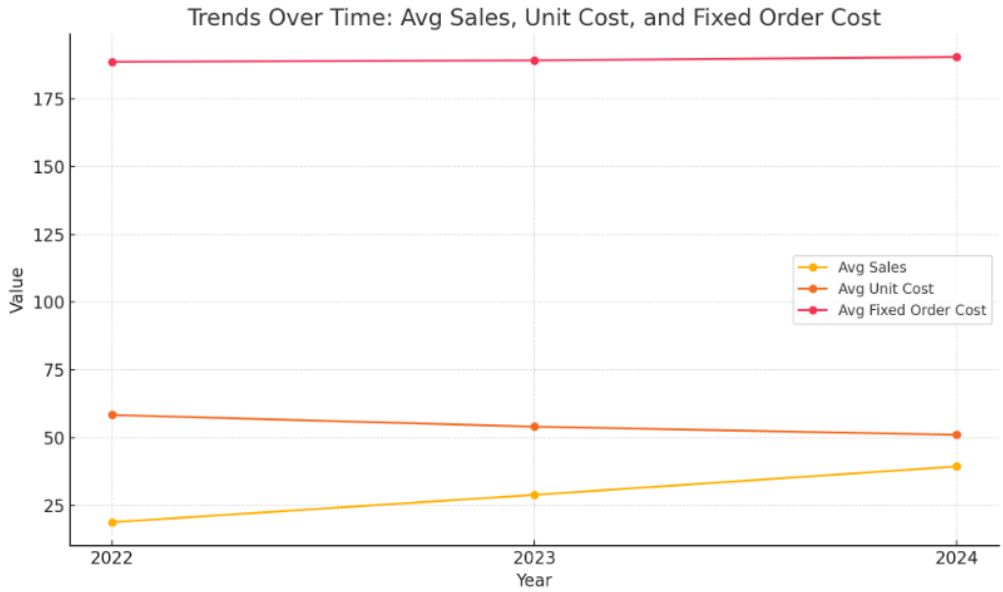
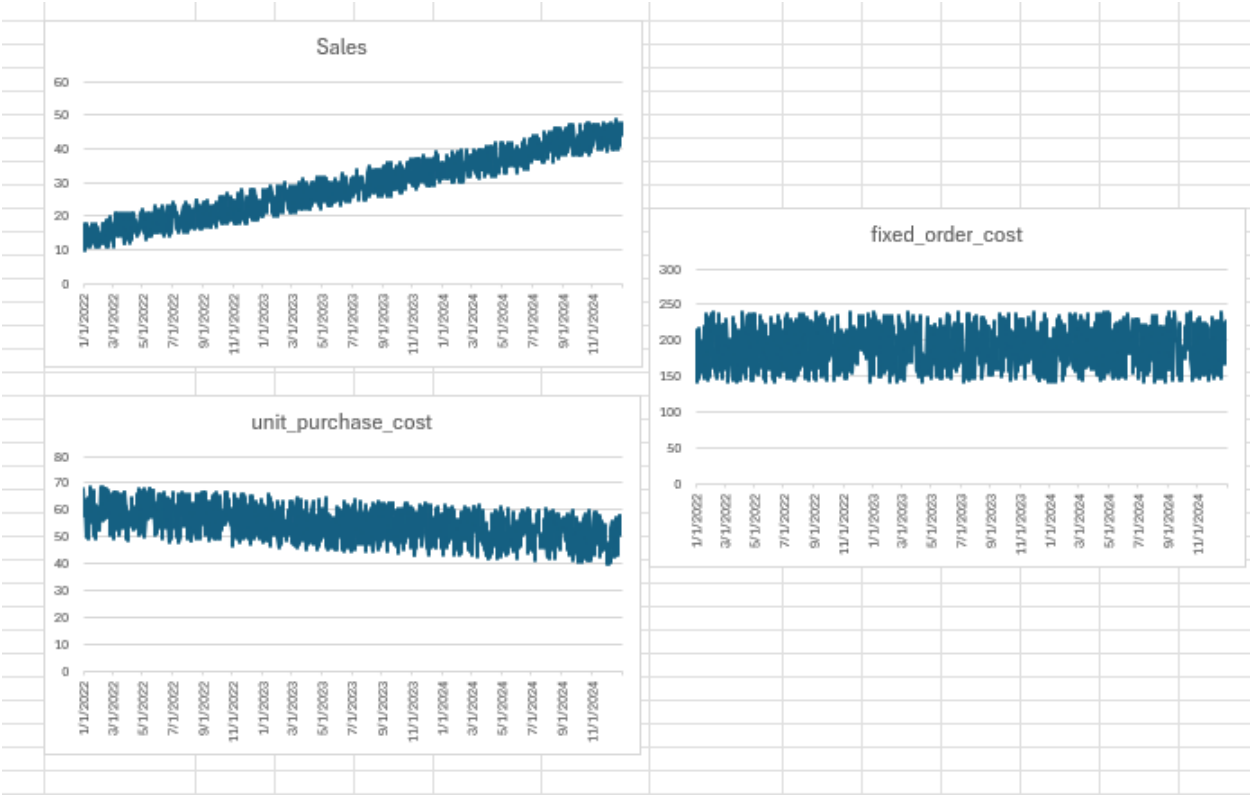
Module 11 – EOQ

Exploratory Data Analysis





Date	Avg Sales	Avg Unit cost	Avg Fixed Order Cost	
2022	18.82465753	58.39767123	188.660411	
2023	28.91506849	54.0799726	189.2015342	
2024	39.36885246	51.06213115	190.4253825	
2025	39.36885246	51.06213115	190.4253825	Forecast (Naïve)

Model Formulation

Objective Function: Total Cost = DC+D/Q*D+Q/2*C
D: annual demand for the item
C: Unit purchase cost for the item
S: fixed cost of placing an order
I: cost of holding inventory for a year
Q: order quantity

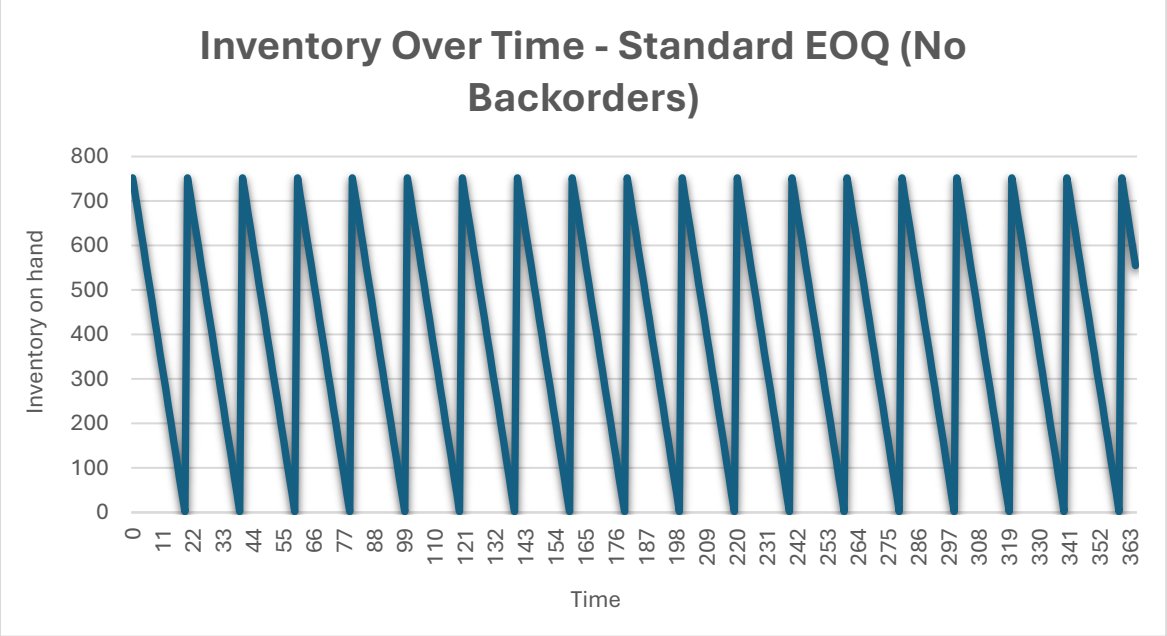
Decision Variables
Order Quantity

Constraints
Order quantity >= 1

Model Optimized for Minimizing Costs with Optimal Order Quantity

D	**Annual Demand**	**14,409**
C	**Cost per Unit**	**$51**
S	**Cost per Order**	**$190**
i	**Holding Cost**	**19%**
Q	**Order Quantity**	**752**
	Purchasing Cost	$735,754
	Cost of Ordering	$3,648
	Inventory Cost	$3,648
	Total Cost	**$743,051**

The model recommends ordering 752 units per order to minimize total inventory costs. This EOQ strikes a balance between ordering costs and holding costs while fulfilling the annual demand efficiently.



(Sawtooth chart for 2025)

Model with Stipulation

D	**Annual Demand**	**14,409**
C	**Cost per Unit**	**$51**
S	**Cost per Order**	**$190**
i	**Holding Cost**	**19%**
A	**Shortage Cost**	**21.00**
b	**Planned Back Orders**	**287**
Q	**Order Quantity**	**909**
	Cost of Holding	$2,064
	Cost of Ordering	$3,017
	Cost of plant back orders	$953
	Total Relevant Cost	**$6,035**

Planned backorders can reduce total costs by allowing companies to hold less inventory while still meeting demand. If some customers are willing to wait, it's more efficient to delay a few orders than to pay high holding costs year-round. This strategy works well when demand is predictable and service levels remain acceptable.