PRACTICAL FILE

MODELING AND SIMULATION LAB

(CS 603)

BE CSE 6TH SEM

(GROUP-4)

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Practical 10

Aim

Simulation of Inventory Management for Supply Chain Optimization.

Simulation of Inventory Management for Supply Chain Optimization

Simulation-based inventory management is a modern approach that leverages computational models to replicate real-world supply chain behaviours. Instead of relying solely on historical data or fixed rules, simulation allows businesses to visualize and test various inventory strategies under dynamic and uncertain conditions such as fluctuating demand, variable lead times, and supply disruptions.

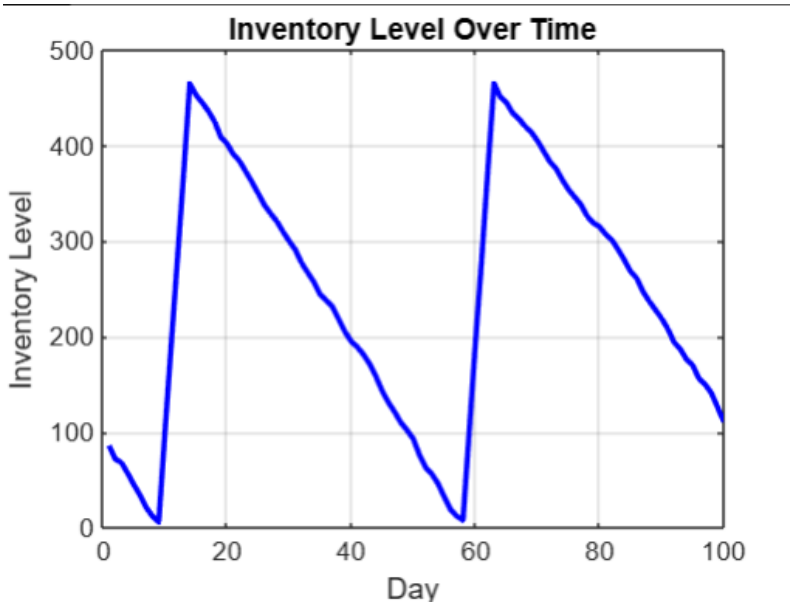
By virtually experimenting with different policies—like reorder points, safety stock levels, or batch ordering—organizations can predict outcomes and fine-tune operations without real-world risks. This empowers data-driven decisions that lead to reduced stockouts, minimized holding costs, and improved customer satisfaction.

Simulation acts as a digital twin of real-world supply chain systems. It provides a risk-free environment to analyse the impact of various inventory decisions before implementing them. From warehouse replenishment to demand forecasting, simulation enables businesses to assess the best-fit policies that minimize cost and maximize service levels.

Code for Implementation of Simulation of Inventory Management for Supply Chain Optimization

```
clc; clear; close all;
numDays = 100;
initialInventory = 100;
reorderPoint = 50;
orderQuantity = 100;
leadTime = 5;
demandMean = 10;
holdingCostPerUnit = 1;
orderingCost = 50;
shortageCostPerUnit = 5;
inventoryLevel = zeros(1, numDays);
inventory = initialInventory;
onOrder = 0;
orders = [];
demandHistory = zeros(1, numDays);
costTotal = 0;
shortage = 0;

for day = 1:numDays
    demand = poissrnd(demandMean);
    demandHistory(day) = demand;

    if inventory >= demand
        inventory = inventory - demand;
    else
        shortage = shortage + (demand - inventory);
        inventory = 0;
    end

    if ~isempty(orders) && orders(1,1) == day
        inventory = inventory + orders(1,2);
        orders(1,:) = [];
    end

    if inventory < reorderPoint && onOrder == 0
        orders = [orders; day + leadTime, orderQuantity];
        costTotal = costTotal + orderingCost;
        onOrder = 1;
    end

    if isempty(orders) || orders(1,1) > day
        onOrder = 0;
    end
    costTotal = costTotal + inventory * holdingCostPerUnit;
    inventoryLevel(day) = inventory;
end

costTotal = costTotal + shortage * shortageCostPerUnit;

fprintf('Total Cost: $%.2f\n', costTotal);
fprintf('Total Shortage Units: %d\n', shortage);

figure;
plot(1:numDays, inventoryLevel, '-b', 'LineWidth', 2);
xlabel('Day');
ylabel('Inventory Level');
title('Inventory Level Over Time');
grid on;
```

Output




```
Total Cost: $24686.00
Total Shortage Units: 7
```