VNIVERSITAT DE VALÈNCIA

Facultat d'Economia

DEGREE IN BUSINESS ADMINSTRATION

35836 Operations Management: Decisions and Resources

(OR/English Group)

Solved Practical Exercises. Chapter 7. Stock Management with Independent Demand

Course: 202223

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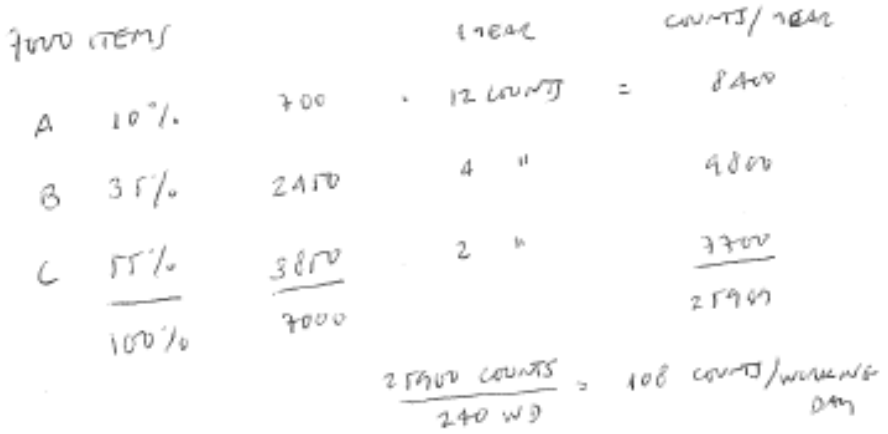
CHAPTER 7. INVENTORY MANAGEMENT WITH INDEPENDENT DEMAND

Exercise ST -1

Lindsay Electronics, a small manufacturer of electronic research equipment, has approximately 7,000 items in its inventory and has hired Joan Blasco-Paul to manage the inventory. Joan has determined that 10% of the items in inventory are A items, 35% are B items, and 55% are C items. She would like to set up a system in which all A items are counted monthly (every 20 working days), all B items are counted quarterly (every 60 working days), and all C items are counted semi-annually (every 120 working days). How many items need to be counted each day?

SOLUTION:

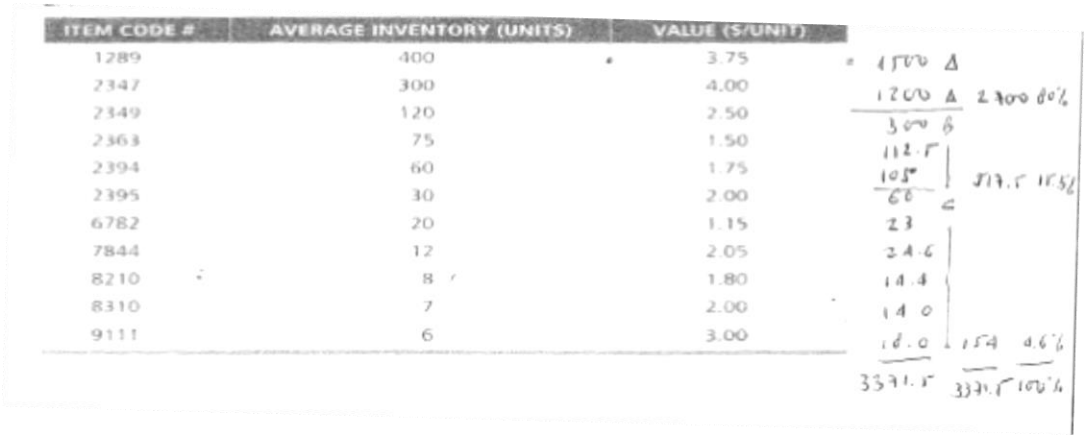


Exercise ST-2

Warner Plastics is a large manufacturer of injection-moulded plastics in Alabama. An investigation of the company's manufacturing facility in Birmingham yields the information presented in the table below. How would the plant classify these items according to an ABC classification system?

ITEM CODE #	AVERAGE INVENTORY (UNITS)	VALUE ($/UNIT)
1289	400	3.75
2347	300	4.00
2349	120	2.50
2363	75	1.50
2394	60	1.75
2395	30	2.00
6782	20	1.15
7844	12	2.05
8210	8	1.80
8310	7	2.00
9111	6	3.00

SOLUTION:



Exercise ST-4

Hopewell Enterprises has the following 10 items in inventory. The manager asks you, a recent OM graduate, to divide these items into ABC classifications.

ITEM	ANNUAL DEMAND	COST/UNIT
A2	3,000	$ 50
B8	4,000	12
C7	1,500	45
D1	6,000	10
E9	1,000	20
F3	500	500
G2	300	1,500
H2	600	20
I5	1,750	10
J8	2,500	5

a) Develop an ABC classification system for the 10 items.

b) How can they use this information?

SOLUTION:

	CODE	ANN DEMAND	COST	DEM X COST	ACCUMULATED	%
A	G2	300	1500	450,000	850,000	78.2%
A	F3	500	500	250,000		
A	A2	3000	50	150,000		
B	C7	1500	45	67,500	175,500	16.1%
B	D1	6000	10	60,000		
B	B8	4000	12	48,000		
C	E9	1000	20	20,000	62,000	5.7%
C	I5	1750	10	17,500		
C	J8	2500	5	12,500		
	H2	600	20	12,000		
				1,087,500	1,087,500	100.0%

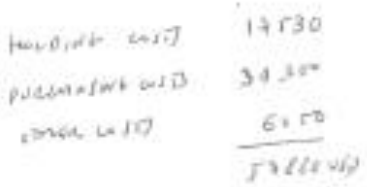
Exercise ST-5

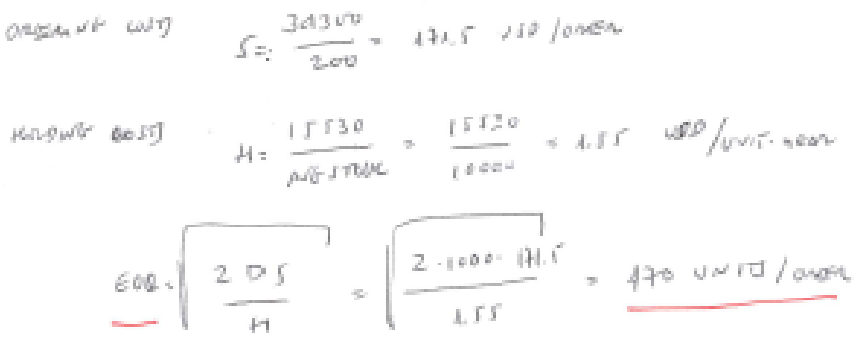
Kim Clark has asked you to help him determine the best ordering policy for a new product. The demand for the new product has been forecasted to be about 1,000 units annually. To help you get a handle on the carrying and ordering costs, Kim has given you the list of last year's costs. He thought that these costs might be appropriate for the new product.

COST FACTOR	COST ($)	COST FACTOR	COST ($)
Taxes for the warehouse	2,000	Warehouse supplies	280
Receiving and incoming inspection	1,500	Research and development	2,750
New product development	2,500	Purchasing salaries & wages	30,000
Acct. Dept. costs to pay invoices	500	Warehouse salaries & wages	12,800
Inventory insurance	600	Pilferage of inventory	800
Product advertising	800	Purchase order supplies	500
Spoilage	750	Inventory obsolescence	300
Sending purchasing orders	800	Purchasing Dept. overhead	1,000

He also told you that these data were compiled for 10,000 inventory items that were carried or held during the year. You have also determined that 200 orders were placed last year. Your job as a new operations management graduate is to help Kim determine the economic order quantity for the new product.

SOLUTION:





EXERCISE ST-8

Lampedusa SpA, located in Agrigento, is eager to use the EOQ purchase approach in a fixed quantity order model. Each unit of product costs €24 and the company spends €90,000 per scope time in its purchases. Assume a scope time of 375 days, a holding cost of 25% of purchasing cost/unit/scope time, and a purchase order emission cost of €50 per order. Please calculate:

a) Economic order quantity.
b) Number of orders per scope time and cycle time.
c) Reorder point if the supplier has a lead time of 10 days and there is no safety stock.
d) Holding and ordering costs per scope time.
e) Graphically represent the exercise.

Furthermore, it manufactures and sells a product for the retail sector, whose production cost is €20. The annual demand is 18,000 units, the company can make them at a rate of 100 units per day, and the average selling rate is 60 units per day. Setup costs for an order are €64, and the holding cost is 20% of the cost per unit and year. You are asked to determine, considering a management scope of one year (300 working days):

f) Optimum lot size.
g) Number of orders and cycle time.
h) Time in which there is simultaneous production and sales and only sales.
i) Maximum stock and average stock.
j) Reorder point assuming a setup time of 7 days, 10 days, and 25 days
k) Graphically represent the exercise.
l) Ordering and holding costs per scope time.

SOLUTION:

a/ $EOQ = \sqrt{\frac{2DS}{H}} = \sqrt{\frac{2 \cdot 3750 \cdot 50}{6}} = 250$ u

$H = 0{,}25 \cdot 24 € = 6 €/u \cdot year$

$D = \frac{90000}{24} = 3750$ u → 10 units/day

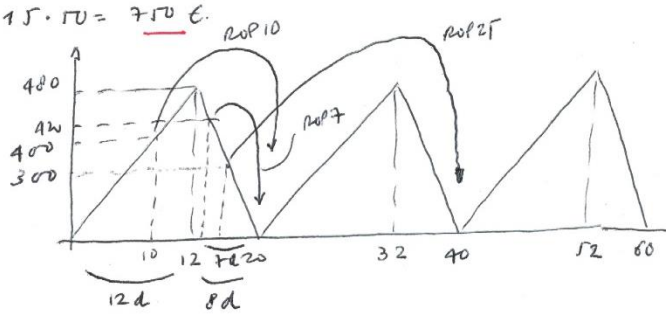
b/ N° OF ORDERS $= \frac{D}{EOQ} = \frac{3750}{250} = 15$ ORDERS

CYCLE: $\frac{SCOPE}{N°OF ORD} = \frac{375}{15} = 25$ days

c/ ROP $= 10 \cdot 10 = 100$ units

d/ HOLDING: $\frac{250}{2} \cdot 6 = 750 €$. ORDERING COST: $15 \cdot 50 = 750 €$.

f) $EOQ = \sqrt{\frac{2DS}{H(1-d/p)}} = \sqrt{\frac{2 \cdot 18000 \cdot 64}{4\,(1-60/100)}} = 1200$ u.



g) N°OF ORD $= \frac{D}{EOQ} = \frac{18000}{1200} = 15$ ORDERS

CYCLE: $\frac{SCOPE}{N°OF ORD} = \frac{300}{15} = 20$ DAYS

h) PROD TIME $= \frac{EOQ}{P} = \frac{1200}{100} = 12$ days SALES ONLY: $20 - 12 = 8$ days

i) MAX STOCK: $12\,(100 - 60) = 480$ u AVG STOCK $= \frac{MAX\ STOCK}{2} = \frac{480}{2} = 240$ u.

j) SETUP 7 days $= 7 \cdot 60 = 420$ u (day 13)

SETUP 10 days $= 10 \cdot 40 = 400$ u (day 10)

SETUP 25 days $= 10 \cdot 60 = 300$ u (day 15, FOR THE NEXT CYCLE)

e)

ORDERING COST $= 15 \cdot 64 = 960 €$

HOLDING COST $= 480 \cdot 4 = 960 €$

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Exercise st-16

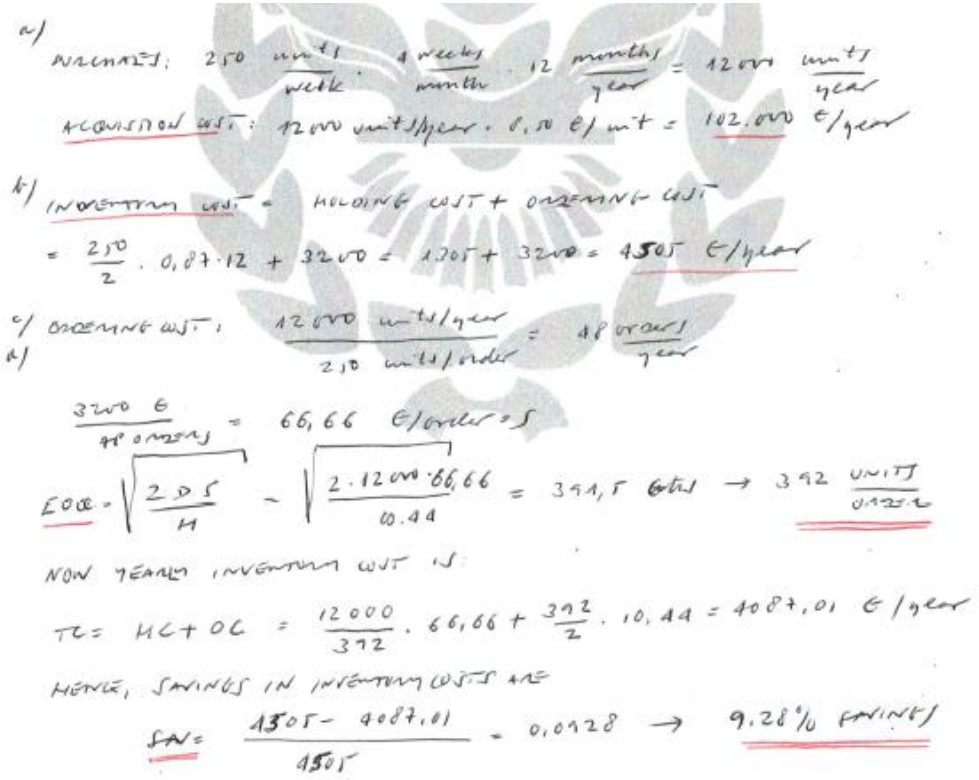
You have just been hired by the Mind Corp. as a purchasing manager. Your first objective is to reduce inventory costs.

The main product that your company stocks and distributes is the PLC-3X1S – whose only manufacturer is the Dutch company Hanssteink, and it charges €8.50 for each one. You usually place a weekly order of 250 units, which takes five working days to be delivered, and so you wonder if you can reduce costs by changing the order frequency. You have estimated that all orders placed in a year have an associated issue cost of about €3,200, while storing a PLC-3X1S in the warehouse for a month costs 87 cents.

a) What is the annual acquisition cost?
b) What is the current annual inventory cost for Mind Corp's PLC-3X1S?
c) By what percentage would you be able to reduce inventory cost by applying EOQ?
d) In that case, how many PLC-3X1Ss would you order each time?
e) How often would you place an order?
f) How many PLC-3X1Ss should be left in the warehouse before you know you must place another order?

NOTE: Consider a week as 5 working days, a month as 4 weeks, and a year as 12 working months.

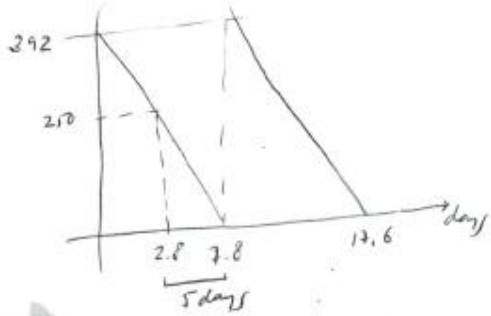
SOLUTION



e) DEMAND: 12000 UNITS/YEAR
SLOPE: 5 · 4 · 12 = 240 WORKING DAYS
DEMAND = 12000/240 = 50 units/day

CYCLE = 392/50 = 7.8 days

f) ROP = LEAD TIME · DAILY DEMAND
= 5 days · 50 units/day
= 250 UNITS



Exercise ST-17 (Not solved)

Smithson Motors is an American car manufacturer. At its largest manufacturing facility, in Yorktown, the company produces subcomponents at a rate of 300 per day and it uses these subcomponents at a rate of 12,500 per year (of 250 working days). Holding costs are $2 per item per year, and ordering costs are $30 per order.

a) What is the economic production quantity?
b) How many production runs per year will be made?
c) What will be the maximum inventory level?
d) What percentage of time will the facility be producing components?
e) What is the annual cost of ordering and holding inventory?

Exercise ST-18 (Not solved)

Sam Moore is the production manager of Playtex, a small producer of metal parts. Playtex supplies Calson, a larger assembly company, with 10,000 wheel bearings a year. This order has been stable for some time. Setup cost for Playtex is $40, and holding cost is $0.60 per wheel bearing per year. Playtex can produce 500 wheel bearings per day. Calson is a just-in-time manufacturer and requires that 50 bearings be delivered each business day.

a) What is the optimum production quantity?
b) What is the maximum number of wheel bearings that will be in inventory at Playtex?
c) How many production runs of wheel bearings will Playtex have in a year?
d) What is the total setup + holding cost for Playtex?