commerce
undergraduate
society

COMM 204 Final Review Session

By: cindy Li

Table of Content

I. Forecasting

1. 2(42) + 3(47) + 4(43) = 397; 397/ (2+3+4) = 44.1
2.

Week	Sales (actual)	3-day weighted moving average	|error|	4-day weighted moving average	|error|
1	17				
2	21				
3	27				
4	31	21.7	9.3		
5	19	26.3	7.3	24.0	5.0
6	17	25.7	8.7	24.5	7.5
7	21	22.3	1.3	23.5	2.5
8		19.0		22.0	

MAD (3-day) = (9.3+7.3+8.7+1.3)/4 = 6.65

MAD (4-day) = (5.0+7.5+2.5)/3 = 5.0

The four week moving average is more accurate as it has lower MAD. The forecast for week 8 using this method is 22.0

3.

		For a = 0.10				For a = 0.50			
Quarter	Actual Tonnage Unloaded	Rounded Forecast	Absolute Deviation	Forecast Error Squared	(Deviationx100)/Actual	Rounded Forecast	Absolute Deviation	Forecast Error Squared	(Deviationx100)/Actual
1	180	175.00	5.00	25.00	2.78	175.00	5.00	25.00	2.78
2	168	175.50	7.50	56.25	4.46	177.50	9.50	90.25	5.65
3	159	174.75	15.75	248.06	9.91	172.75	13.75	189.06	8.65
4	175	173.18	1.82	3.31	1.04	165.88	9.12	83.17	5.21
5	190	173.36	16.64	276.89	8.76	170.44	19.56	382.59	10.29
6	205	175.02	29.98	898.80	14.62	180.22	24.78	614.05	12.09
7	180	178.02	1.98	3.92	1.10	192.61	12.61	159.01	7.01
8	182	178.22	3.78	14.29	2.08	186.30	4.30	18.49	2.36
Sum			82.45	1526.52	44.75		98.62	1561.63	54.04

MAD (for a = 0.10) = 82.45/8 = 10.31

MAD (for a = 0.50) = 98.62/8 = 12.33

Using a smoothing average of 0.10 is more accurate as it has lower MAD.

II. Inventory Management

1.

a) D = 40 packages/day * 246 days/year = 9840 packages
S = $ 6 per order

H= $ 1 per package per year

EOQ = $\sqrt{\frac{2DS}{H}} = \sqrt{\frac{2(9840)(6)}{1}} = \sqrt{118080} = 343.6277 \approx$ 344 packages

b) $TC = \frac{Q}{2}H + \frac{D}{Q}S = \frac{344}{2}(1) + \frac{9840}{344}(6) = 172 + 171.63 = \$343.63$

c) The annual ordering and holding costs are always equal at the EOQ because the optimal order quantity is found at the minimum point on the total cost curve, which is where the ordering and holding cost curves intersect (they equal).

d) $TC_{380} = \frac{380}{2}(1) + \frac{9840}{380}(6) = 190 + 155.37 = \$345.37$

Difference between TC_{380} and TC_{344} = $345.37 – $343.63 = $1.74

The difference between the current order size and the optimal order quantity is 380-344 = 36 packages and the total annual cost of ordering and holding the 380 boxes is $345.37, which is only $1.74 more expensive than the optimal order quantity's total cost. Therefore, the difference of $1.74 per year is not big enough to suggest that the office manager should change his current order size (only $1.74 higher than with EOQ, so 380 is acceptable).

2. Expected annual demand = 800 boxes/month * 12 months = 9600 boxes/year

<u>For Supplier A:</u>

Annual holding cost:

Quantity $_{(1\text{-}199)}$: $14.00*25% = $3.50

Quantity $_{(200\text{-}499)}$: $13.80*25% = $3.45

Quantity $_{(500+)}$: $13.60*25% = $3.40

$EOQ_{(1\text{-}199)} = \sqrt{\frac{2DS}{iC}} = \sqrt{\frac{2(9600)(40)}{3.50}}$ = 468.43 (not feasible, adjust to 199)

$EOQ_{(200\text{-}499)} = \sqrt{\frac{2DS}{iC}} = \sqrt{\frac{2(9600)(40)}{3.45}}$ = 471.81 (feasible)

$EOQ_{(500+)} = \sqrt{\frac{2DS}{iC}} = \sqrt{\frac{2(9600)(40)}{3.40}}$ = 475.27 (not feasible, adjust to 500)

TC = (D/Q)(S) + (Q/2)(H) + DC

$TC_{(1\text{-}199)}$ = (9600/199)(40) + (199/2)(3.50) + (14.00)(9600) = $136,677.90

$TC_{(200\text{-}499)}$ = (9600/472)(40) + (472/2)(3.45) + (13.80)(9600) = $134,107.76

$TC_{(500+)}$ = (9600/500)(40) + (500/2) (3.40) + (13.60)(9600) = $132,178

For supplier A, the optimal order quantity is 500 boxes at $132,178.

For Supplier B:

Annual holding cost:

Quantity $_{(1\text{-}149)}$: $14.10*25% = $3.525

Quantity $_{(150\text{-}349)}$: $13.90*25% = $3.475

Quantity $_{(350+)}$: $13.70*25% = $3.425

$EOQ_{(1\text{-}149)} = \sqrt{\frac{2DS}{IP}} = \sqrt{\frac{2(9600)(40)}{3.525}}$ = 466.77 (not feasible, adjust to 149)

$EOQ_{(150\text{-}349)} = \sqrt{\frac{2DS}{IP}} = \sqrt{\frac{2(9600)(40)}{3.475}}$ = 470.11 (not feasible, adjust to 349)

$EOQ_{(350+)} = \sqrt{\frac{2DS}{IP}} = \sqrt{\frac{2(9600)(40)}{3.425}}$ = 473.53 (feasible)

TC = (D/Q)(S) + (Q/2)(H) + DC

$TC_{(1\text{-}149)}$ = (9600/149) (40) + (149/2) (3.525) + (14.10) (9600) = $138,199.79

$TC_{(150\text{-}349)}$ = (9600/349) (40) + (349/2) (3.475) + (13.90) (9600) = $135,146.67

$TC_{(350+)}$ = (9600/474) (40) + (474/2) (3.425) + (13.70) (9600) = $133,141.85

For supplier B, the optimal order quantity is 474 boxes at $133,141.85.

Conclusion: Supplier A should be used, with the optimal order quantity being 500 boxes to minimize total annual costs.

CMP

III. More Inventory Management

1.

Demand = 80 kg

Standard deviation = 10 kg

Lead time = 7 days

Service level = 100% - 10% = 90%, z = 1.29

ROP = demand during lead time + $Z\sigma_{dLT}$

= 80 (7) + 1.29$(10\sqrt{7})$

= 560 + 34.13

= 594.13 kg

2.

a) *ROP = demand during lead time +* $Z\sigma_{dLT}$ = 14(2) + 1.65(2.5)($\sqrt{2}$) = 33.83 kg

b) Q* = 14(2+5) + 1.65(2.5)($\sqrt{(2+5)}$) – 4 = 104.91 kg

IV. Project Management

a. Critical path A-B-D-H-I.

b. Estimated normal completion time is 4+3+5+4+6=22 weeks.

c.

Activity	Cost per week	Possible decrease
A	500	2
B	3000	1
C	2000	1
D	2000	2
E	0	0
F	1000	1
G	6000	2
H	2333.333	3
I	9000	1

1st week: CP=A-B-D-H-I. Crash A at $500. CP stays the same.

2nd week: Crash A again. CP stays the same.

3rd week: A is no longer available. It is going to be either B, D, H, or I. We choose D at $2,000. Total cost for the project shortened three weeks is $97,000.

V. Newsvendor Problems

1. $C_o = 3.50 - 0 = 3.50$
   $C_u = 5.00 - 3.50 = 1.50$
   Critical ratio = 1.5 / (1.5 + 3.5) = 0.3

No. of tarts	Cumulative Probability
3	0.05
4	0.17
5	0.37

Order item Q + 1 if F(Q) < critical ratio --> Order 5 items.