Production Operations Management Portfolio (POM)

Curtis Hubbard Jr.

MGNT 3185, M-F 12:00p.m.-01:50p.m.

Table of Contents

b. Explanatory Paragraph

c. Appendix A

VII. Computer Lab Assignment #7

a. Cover Page

b. Explanatory Paragraph

c. Appendix A

VIII. Computer Lab Assignment #8

a. Cover Page

b. Explanatory Paragraph

c. Appendix A

Computer Lab Assignment #1

Curtis Hubbard Jr.

MGNT 3185, MW 06:00-07:15p.m.

Explanatory Paragraph for Computer Lab Assignment #1

Using the Management Scientists software a 3-month Simple Moving Average (SMA) forecast and an Exponential Smoothing (ES) forecast were conducted. The Mean Squared Error (MSE) for ES was 329.81 while the MSE for SMA was 296.11. The SMA is the superior forecasting technique, because it has a lower MSE. The forecast for period 9 using the SMA forecasting technique was 758.67.

FORECASTING WITH MOVING AVERAGES
****

THE MOVING AVERAGE USES 2 TIME PERIODS

TIME PERIOD	TIME SERIES VALUE	FORECAST	FORECAST ERROR
1	770		
2	797		
3	790	783.50	6.50
4	782	793.50	-11.50
5	765	786.00	-21.00
6	702	773.50	-71.50
7	700	733.50	-33.50
8	759	701.00	58.00

THE MEAN SQUARE ERROR 1,702.33

THE FORECAST FOR PERIOD 9 729.50

Computer Lab Assignment #2

Curtis Hubbard Jr.

MGNT 3185, MW 06:00-07:15p.m.

Explanatory Paragraph for Computer Lab Assignment #2

$$F_t = 143.8 + 1.945t$$

Using the Management Scientist software a linear trend equation was developed. If no units were sold then big T would equal 143.8 units sold. If little t were equal to 18, then big T would equal 178.81 units sold (143.8 + 1.945(18) = 178.81 units sold). The forecast for period 20 is 182.70 units sold.

FORECASTING WITH LINEAR TREND
****

THE LINEAR TREND EQUATION:

$$T = 150.067 + 0.697\,t$$

where T = trend value of the time series in period t

TIME PERIOD	TIME SERIES VALUE	FORECAST	FORECAST ERROR
1	166	150.76	15.24
2	148	151.46	-3.46
3	150	152.16	-2.16
4	147	152.86	-5.86
5	155	153.55	1.45
6	144	154.25	-10.25
7	155	154.95	0.05
8	146	155.64	-9.64
9	150	156.34	-6.34
10	178	157.04	20.96

THE MEAN SQUARE ERROR	96.28
THE FORECAST FOR PERIOD 11	157.73
THE FORECAST FOR PERIOD 12	158.43
THE FORECAST FOR PERIOD 13	159.13
THE FORECAST FOR PERIOD 14	159.83
THE FORECAST FOR PERIOD 15	160.52
THE FORECAST FOR PERIOD 16	161.22
THE FORECAST FOR PERIOD 17	161.92
THE FORECAST FOR PERIOD 18	162.61
THE FORECAST FOR PERIOD 19	163.31
THE FORECAST FOR PERIOD 20	164.01

Computer Lab Assignment #3

Curtis Hubbard Jr.

MGNT 3185, MW 06:00-07:15p.m.

Explanatory Paragraph for Computer Lab Assignment #3

$$Y= 4.517+ 1.627X$$

A regression analysis was conducted to determine if the bus and trolley ridership demand has any relationship to the number of tourists visiting TyTy, Georgia on an annual basis. The significant predictor of the omnibus F-test is .001. The coefficient of determinants (r^2) is .821. This confirms that approximately 82% of the variability in the dependent values can be determined by the independent variable. The coefficients of correlation is .906, indicating that there will be a strong positive relationship between the two variables. If there are no tourists the predicted ridership will be 4.517. If 11 million people visit the city the predicted ridership will be approximately 17,897,005.

DECISION ANALYSIS
****

YOU HAVE INPUT THE FOLLOWING PAYOFF TABLE:
****

	STATES OF NATURE	
DECISION	1	2
********	******	******
1	220000	-18000
2	116000	-21500
3	0	0
PROBABILITIES OF STATES	0.300	0.700

DECISION RECOMMENDATION
****

USING THE EXPECTED VALUE CRITERION

DECISION ALTERNATIVE	CRITERION VALUE	RECOMMENDED DECISION
1	53,400.00	YES
2	19,750.00	
3	0.00	

EXPECTED VALUE OF PERFECT INFORMATION IS 12,600.00

Computer Lab Assignment #4

Curtis Hubbard Jr.

MGNT 3185, MW 06:00-07:15p.m.

Explanatory Paragraph for Computer Lab Assignment #4

Using The Management Scientist a decision analysis was conducted for the optimistic, conservative, regret and Expected Value with Perfect Information (EVPI) approaches. The optimistic approach is the best outcome, because it has the highest payoff with a value of $300,000.00. The decision is to construct a large plant in another city. The EVPI is $68,000.00.

DECISION ANALYSIS
****

YOU HAVE INPUT THE FOLLOWING PAYOFF TABLE:
****

	STATES OF NATURE	
DECISION	1	2
********	******	******
1	220000	-18000
2	116000	-21500
3	0	0

DECISION RECOMMENDATION
****

USING THE OPTIMISTIC CRITERION

DECISION ALTERNATIVE	CRITERION VALUE	RECOMMENDED DECISION
1	220,000.00	YES
2	116,000.00	
3	0.00	

Computer Lab Assignment #5

Curtis Hubbard Jr.

MGNT 3185, MW 06:00-07:15p.m.

Explanatory Paragraph for Computer Lab Assignment #5

Using The Management Scientist a decision analysis was conducted for the optimistic, conservative and regret approaches. The decision is to hire and train two new workers, because the conservative approach has the highest payoff with a value $60,000.00. The costs under the conservative approach are $75,000.00 to reassign present staff, $60,000.00 to hire and train two new workers, and $94,000.00 to redesign current practices. The costs under the optimistic approach are $50,000.00 to reassign present staff, $50,000.00 to hire and train two new workers, and $42,000.00 to redesign current practices.

DECISION ANALYSIS
****

YOU HAVE INPUT THE FOLLOWING PAYOFF TABLE:
****

	STATES OF NATURE		
DECISION	1	2	3
1	50	70	87
2	62	65	78
3	43	55	94

DECISION RECOMMENDATION
****

USING THE OPTIMISTIC CRITERION

DECISION ALTERNATIVE	CRITERION VALUE	RECOMMENDED DECISION
1	50.00	
2	62.00	
3	43.00	YES

DECISION ANALYSIS
****

YOU HAVE INPUT THE FOLLOWING PAYOFF TABLE:
****

	STATES OF NATURE		
DECISION	1	2	3
1	50	70	87
2	62	65	78
3	43	55	94

DECISION RECOMMENDATION
****

USING THE CONSERVATIVE CRITERION

DECISION ALTERNATIVE	CRITERION VALUE	RECOMMENDED DECISION
1	87.00	
2	78.00	YES
3	94.00	

DECISION ANALYSIS
****

YOU HAVE INPUT THE FOLLOWING PAYOFF TABLE:
****

	STATES OF NATURE		
DECISION	1	2	3
1	50	70	87
2	62	65	78
3	43	55	94

DECISION RECOMMENDATION
****

USING THE MINIMAX REGRET CRITERION

DECISION ALTERNATIVE	CRITERION VALUE	RECOMMENDED DECISION
1	15.00	YES
2	19.00	
3	16.00	

Computer Lab Assignment #6

Curtis Hubbard Jr.

MGNT 3185, MW 06:00-07:15p.m.

Explanatory Paragraph for Computer Lab Assignment #6

Using The Management Scientist software, the optimal solution for the maximization model was standard golf bag (S) = 538.418 hours and deluxe golf bag (D) = 253.107 hours with an objective function value of 7662.147. Reduced Costs values for both decision variables were zero, indicating that the variable had already attained a positive value in the optimal solution. With respect to Slack/Surplus, Constraint 2 had 120.712 units of excess capacity while Constraint 4 had 17.881units of Surplus. Constraints 1 and 3 had zero Slack and zero Surplus, respectively. Constraint 1 had a Dual Price of 4.331, indicating that for each additional one-unit increase in the Right Hand Side (RHS) $4.33 would be added to the value of the objective function. Furthermore, Constraint 3 had a Dual Price of 6.968, indicating that an additional one-unit increase in the RHS value of Constraint 4 would result in a $6.97 increase in the value of the objective function.

For S, the optimal solution will hold as long as its value is between 6.300 and 13.433. For D, the optimal solution will hold as long as its value is between 6.700 and 14.286. The RHS value for Constraints 1 and 3 will remain optimal as long as their values are between 495.600 to 681.885 and 581.400 to 708.000, respectively. Finally, the RHS values for Constraints 2 and 4 will remain optimal as long as their values are between 479.288 to positive infinity and 117.119 to positive infinity to 14.00, respectively.

LINEAR PROGRAMMING PROBLEM

MAX 10X1+9X2

S.T.

1) .7X1+1X2<630
2) .5X1+.8333X2<600
3) 1X1+.6666X2<708
4) .1X1+.2500X2<135

OPTIMAL SOLUTION

Objective Function Value = 7668.1165

Variable	Value	Reduced Costs
X1	540.0315	0.0000
X2	251.9780	0.0000

Constraint	Slack/Surplus	Dual Prices
1	0.0000	4.3759
2	120.0110	0.0000
3	0.0000	6.9369
4	18.0024	0.0000

OBJECTIVE COEFFICIENT RANGES

Variable	Lower Limit	Current Value	Upper Limit
X1	6.3000	10.0000	13.5014
X2	6.6660	9.0000	14.2857

RIGHT HAND SIDE RANGES

Constraint	Lower Limit	Current Value	Upper Limit
1	495.6000	630.0000	682.3732
2	479.9890	600.0000	No Upper Limit
3	579.9720	708.0000	900.0000
4	116.9976	135.0000	No Upper Limit

Computer Lab Assignment #7

Curtis Hubbard Jr.

MGNT 3185, MW 06:00-07:15p.m.

Explanatory Paragraph for Computer Lab Assignment #7

Using the Management Scientist software, the economic order quantity (EOQ) for the TyTy Beverage Company is 663.32. This value also reflects the maximum inventory level. When the quantity of inventory reaches $583.73 the total annual cost is minimized. The total cost is equivalent to the sum of the annual inventory holding cost ($291.86) and the annual ordering cost ($291.86). TyTy Georgia Beverage Company has a cycle time of 27.14 days; this is the number of days before the company has to reorder. The company operates 360 days out of the year and orders 13.27 times within the operating period. When the on hand inventory drops below 146.67 the TyTy Beverage Company has to reorder more products. The average inventory level is half the EOQ and has a value of 331.66.

INVENTORY MODEL
****

ECONOMIC ORDER QUANTITY
****

YOU HAVE INPUT THE FOLLOWING DATA:
****

ANNUAL DEMAND = 3900 UNITS PER YEAR

ORDERING COST = $20 PER ORDER

INVENTORY HOLDING COST:
   A. ANNUAL INVENTORY CARRYING CHARGE = 11.0%
   B. COST PER UNIT = $ 4 PER UNIT

WORKING DAYS PER YEAR = 360 DAYS

LEAD TIME FOR A NEW ORDER = 4 DAYS

INVENTORY POLICY
****

OPTIMAL ORDER QUANTITY	595.44
ANNUAL INVENTORY HOLDING COST	$131.00
ANNUAL ORDERING COST	$131.00
TOTAL ANNUAL COST	$261.99
MAXIMUM INVENTORY LEVEL	595.44
AVERAGE INVENTORY LEVEL	297.72
REORDER POINT	43.33
NUMBER OF ORDERS PER YEAR	6.55
CYCLE TIME (DAYS)	54.96

Computer Lab Assignment #8

Curtis Hubbard Jr.

MGNT 3185, MW 06:00-07:15p.m.

Explanatory Paragraph for Computer Lab Assignment #8

Using the Management Scientist software, the economic order quantity is 2,500.00; this is the point that the ordering and holding cost are at their lowest. The annual cost is $31,229.70, which is the sum of the annual ordering and holding cost. The average inventory level is half of the optimal order quantity and has a value of 1,250.00. The cycle time is 96.15 days between orders. When inventory drops to 130.00 the company will order more supplies. The company has 250 working days a year and makes 2.60 orders per year.

INVENTORY MODEL
****

ECONOMIC ORDER QUANTITY WITH QUANTITY DISCOUNTS
****

YOU HAVE INPUT THE FOLLOWING DATA:
****

QUANTITY DISCOUNT INFORMATION

CATEGORY	UNIT COST	MINIMUM QUANTITY
1	$5.00	0
2	$4.85	1000
3	$4.75	2500

ANNUAL DEMAND = 6500 UNITS PER YEAR

ORDERING COST = $47 PER ORDER

ANNUAL INVENTORY CARRYING CHARGE = 21

WORKING DAYS PER YEAR = 250 DAYS

LEAD TIME FOR A NEW ORDER = 5 DAYS

INVENTORY POLICY
****

OPTIMAL ORDER QUANTITY	2,500.00
ANNUAL INVENTORY HOLDING COST	$1,246.88
ANNUAL ORDERING COST	$122.20
ANNUAL PURCHASE COST	$30,875.00
TOTAL ANNUAL COST	$32,244.08
MAXIMUM INVENTORY LEVEL	2,500.00
AVERAGE INVENTORY LEVEL	1,250.00
REORDER POINT	130.00
NUMBER OF ORDERS PER YEAR	2.6
CYCLE TIME (DAYS)	96.15