IE375 Spring 2020 Case Set I

Note: These cases do not have a solution. You have to think these cases as real problems and hence try to find an approach rather than actually solving it. The expectation is simple: you learn the material while coming up with different, possible approaches which will make sense for the given description. Learning the material includes:

1) **Going over the assumptions of the methods we covered in class.**
2) **Understand the need for additional reading/learning (starting with the text book and then others)**
3) **Additional information you need to have a better understanding.**

Russell, Roberta S., and Bernard W. Taylor-III. Operations management along the supply chain. 7th ed. John Wiley & Sons, 2011.

1) Problem 12.1, page 549,

2) Problem 12.2, page 549,

3) Problem 12.3, page 550,

4) Problem 12.4, page 551.

a. Using Excel, develop the multiple regression equation for these data.
b. What is the coefficient of determination for this regression equation? Do you think the superintendent is correct in his beliefs?
c. Montgomery County has an average SOL score of 74 with an average teacher's salary of $27,500 and an average teacher tenure of 7.8 years. The superintendent has proposed to the school board a salary increase that would raise the average salary to $30,000 and a benefits program with a goal of increasing the average tenure to nine years. He has suggested that if the board passes his proposals the average SOL score will increase to 80. Is he correct according to the forecasting model?

CASE PROBLEM 12.1

Forecasting at State University

During the past few years the legislature has severely reduced funding for State University. In reaction, the administration at State has significantly raised tuition each year for the past five years. A bargain five years ago, State is now considered an expensive state-supported university. Some parents and students now question the value of a State education, and applications for admission have declined. Since a portion of state educational funding is based on a formula tied to enrollments, State has maintained its enrollment levels by going deeper into its applicant pool and accepting less qualified students.

On top of these problems, an increase in the college-age population is expected in this decade. Key members of the state legislature have told the university administration that State will be expected to absorb additional students during this decade. However, because of the economic outlook and the budget situation, State should not expect any funding increases for additional facilities, classrooms, dormitory rooms, or faculty. The university already has a classroom deficit in excess of 25%, and class sizes are above the average of their peer institutions.

The president of the university, Tanisha Lindsey, established several task forces consisting of faculty and administrators to address these problems. These groups made a number of recommendations, including the implementation of total quality management (TQM) practices and more in-depth, focused planning.

Discuss in general terms how forecasting might be used for planning to address these specific problems and the role of forecasting in initiating a TQM approach. Include in your discussion the types of forecasting methods that might be used.

CASE PROBLEM 12.2

The University Bookstore Student Computer Purchase Program

The University Bookstore is owned and operated by State University through an independent corporation with its own board of directors. The bookstore has three locations on or near the State University campus. It stocks a range of items, including textbooks, trade books, logo apparel, drawing and educational supplies, and computers and related products such as printers, modems, and software. The bookstore has a program to sell personal computers to incoming freshmen and other students at a substantial educational discount partly passed on from computer manufacturers. This means that the bookstore just covers computer costs with a very small profit margin remaining.

Each summer all incoming freshmen and their parents come to the State campus for a three-day orientation program. The students come in groups of 100 throughout the summer. During their visit the students and their parents are given details about the bookstore's computer purchase program. Some students place their computer orders for the fall semester at this time, while others wait until later in the summer. The bookstore also receives orders from returning students throughout the summer. This program presents a challenging supply chain management problem for the bookstore.

Orders come in throughout the summer, many only a few weeks before school starts in the fall, and the computer suppliers require at least six weeks for delivery. Thus, the bookstore must forecast computer demand to build up inventory to meet student demand in the fall. The student computer program and the forecast of computer demand have repercussions all along the bookstore supply chain. The bookstore has a warehouse near campus where it must store all computers since it has no storage space at

(*Continued*)

its retail locations. Ordering too many computers not only ties up the bookstore's cash reserves, but also takes up limited storage space and limits inventories for other bookstore products during the bookstore's busiest sales period. Since the bookstore has such a low profit margin on computers, its bottom line depends on these other products. As competition for good students has increased, the university has become very quality-conscious and insists that all university facilities provide exemplary student service, which for the bookstore means meeting all student demands for computers when the fall semester starts. The number of computers ordered also affects the number of temporary warehouse and bookstore workers that must be hired for handling and assisting with PC installations. The number of truck trips from the warehouse to the bookstore each day of fall registration is also affected by computer sales.

The bookstore student computer purchase program has been in place for 14 years. Although the student population has remained stable during this period, computer sales have been somewhat volatile. Following is the historical sales data for computers during the first month of fall registration:

Year	Computers Sold	Year	Computers Sold
1	518	8	792
2	651	9	877
3	708	10	693
4	921	11	841
5	775	12	1009
6	810	13	902
7	856	14	1103

Develop an appropriate forecast model for bookstore management to use to forecast computer demand for the next fall semester and indicate how accurate it appears to be. What other forecasts might be useful to the bookstore in managing its supply chain?

CASE PROBLEM 12.3

Cascades Swim Club

The Cascades Swim Club has 300 stockholders, each holding one share of stock in the club. A share of club stock allows the shareholder's family to use the club's heated outdoor pool during the summer upon payment of annual membership dues of $175. The club has not issued any stock in years, and only a few of the existing shares come up for sale each year. The board of directors administers the sale of all stock. When a shareholder wants to sell, he or she turns the stock into the board, which sells it to the person at the top of the waiting list. For the past few years, the length of the waiting list has remained relatively steady at approximately 20 names.

However, during the past winter two events occurred that have suddenly increased the demand for shares in the club. The winter was especially severe, and subzero weather and heavy ice storms caused both the town and the county pools to buckle and crack. The problems were not discovered until maintenance crews began to prepare the pools for the summer, and repairs cannot be completed until the fall. Also during the winter, the manager of the local country club had an argument with her board of directors and one night burned down the clubhouse. Although the pool itself was not damaged, the dressing room facilities, showers, and snack bar were destroyed. As a result of these two events, the Cascades Swim Club was inundated with applications to purchase shares. The waiting list suddenly grew to 250 people as the summer approached.

The board of directors of the swim club had refrained from issuing new shares in the past because there never was a very great demand, and the demand that did exist was usually absorbed within a year by stock turnover. In addition, the board has a real concern about overcrowding. It seemed like the present membership was about right, and there were very few complaints about overcrowding, except on holidays such as Memorial Day and the Fourth of July. However, at a recent board meeting a number of new applicants had attended and asked the board to issue new shares. In addition, a number of current shareholders suggested that this might be an opportunity for the club to raise some capital for needed repairs and to improve some of the existing facilities. This was tempting to the board. Although it had set the share price at $500 in the past, the board could set it at a much higher level now. In addition, an increase in attendance could create a need for more lifeguards.

Before the board of directors could make a decision on whether to sell more shares and, if so, how many, the board members felt they needed more information. Specifically, they would like a forecast of the average number of people (family members, guests, etc.) who might attend the pool each day during the summer with the current number of shares.

The board of directors has the following daily attendance records for June through August from the previous summer; it thinks the figures would provide accurate estimates for the upcoming summer.

M-139	W-380	F-193	Su-399	T-177	Th-238
T-273	Th-367	Sa-378	M-197	W-161	F-224
W-172	F-359	Su-461	T-273	Th-308	Sa-368
Th-275	Sa-463	M-242	W-213	F-256	Su-541
F-337	Su-578	T-177	Th-303	Sa-391	M-235
Sa-402	M-287	W-245	F-262	Su-400	T-218
Su-487	T-247	Th-390	Sa-447	M-224	W-271

M-198	W-356	F-284	Su-399	T-239	Th-259
T-310	Th-322	Sa-417	M-275	W-274	F-232
W-347	F-419	Su-474	T-241	Th-205	Sa-317
Th-393	Sa-516	M-194	W-190	F-361	Su-369
F-421	Su-478	T-207	Th-243	Sa-411	M-361
Sa-595	M-303	W-215	F-277	Su-419	
Su-497	T-223	Th-304	Sa-241	M-258	
M-341	W-315	F-331	Su-384	T-130	
T-291	Th-258	Sa-407	M-246	W-195	

Develop a forecasting model to forecast daily demand during the summer.

CASE PROBLEM 12.4

Forecasting Passenger Arrivals at the Gotham International Airport

Since the terrorist attacks of 9/11 and the ensuing measures by the federal Transportation Security Administration (TSA) to increase airline security, airports have faced the problem of long waiting lines and waiting times at security gates. One of the key components of any effort by the TSA to operationally improve airport security procedures while reducing passenger waiting times and inconvenience is forecasting passenger arrivals at security checkpoints in order to determine how many security checkpoints and staff are needed. At the Gotham International Airport, TSA operations analysts would like to forecast passenger arrivals for next July, the airport's busiest travel month of the year, for the purpose of determining how many security checkpoints they should staff during the month in order that waiting lines and times will not be excessively long. Demand for airline travel has generally been increasing during the past three years. There are two main concourses at Gotham International, East and West, each serving different airlines. The following table shows passenger arrivals at the West concourse for 10 days (selected randomly) in two-hour segments from 4:00 A.M. to 10:00 P.M. for the month of July for the past three years.

	Day	4–6 A.M.	6–8 A.M.	8–10 A.M.	10–noon	noon–2 P.M.	2–4 P.M.	4–6 P.M.	6–8 P.M.	8–10 P.M.
	1	2400	2700	3200	1400	1700	1800	1600	800	200
	2	1900	2500	3100	1600	1800	2000	1800	900	300
	3	2300	3100	2500	1500	1500	1800	1900	1100	200
	4	2200	3200	3100	2200	1900	2400	2100	1200	400
Year 1	5	2400	3300	3400	1700	2200	2100	2000	1000	600
	6	2600	2800	3500	1500	1700	1900	1500	1100	300
	7	1900	2800	3100	1200	1500	2000	1400	900	400
	8	2000	2700	2500	1500	2000	2300	1900	1000	200
	9	2400	3200	3600	1600	2100	2500	1800	1400	200
	10	2600	3300	3100	200	2500	2600	2400	1100	400
	11	3100	3900	4100	2200	2600	2300	2500	1100	300
	12	2800	3400	3900	1900	2100	2500	2000	1200	300
	13	2700	3800	4300	2100	2400	2400	2400	1200	400
	14	2400	3500	4100	2400	3000	3200	2600	1200	700
Year 2	15	3300	3700	4000	2600	2600	2700	2900	1000	300
	16	3500	4000	3800	2300	2700	3100	3000	900	200
	17	2900	4100	3900	2400	3000	3200	2500	1100	500
	18	3400	3800	4200	2000	2500	3000	2200	1000	300

	Day	4–6 A.M.	6–8 A.M.	8–10 A.M.	10–noon	noon–2 P.M.	2–4 P.M.	4–6 P.M.	6–8 P.M.	8–10 P.M.
Year 3	19	3600	3600	4000	2300	2600	2800	2600	1200	200
	20	3700	3700	4000	2200	2600	2700	2400	1200	200
	21	4400	4400	4500	2600	3300	3400	3000	1200	400
	22	4200	4500	4300	2500	3400	3600	3100	1400	300
	23	4500	4500	4700	2700	3400	3500	2900	1200	300
	24	4600	4600	4600	2500	3200	3500	2800	1300	300
	25	4500	4300	4400	2900	3300	3300	3300	1500	400
	26	4200	4300	4500	3000	4000	3400	3000	1500	600
	27	4500	4500	5100	3300	4000	3700	3100	1200	300
	28	4300	4200	4300	2800	3500	4000	3300	1100	400
	29	4900	4100	4200	3100	3600	3900	3400	1400	500
	30	4700	4500	4100	3000	4000	3700	3400	1200	500

Develop a forecast for daily passenger arrivals at the West concourse at Gotham for each time period for July of year 4. Discuss the various forecast model variations that might be used to develop this forecast.

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