PGDM, PGDM-IB, 2020-22
Service Operations Management
DM-342/IB-343
Trimester – III, End-Term Examination: April 2021

Time allowed: 2 Hrs 30 Min
Max Marks: 50

Roll No: _____

Instructions: Students are required to write Roll No on every page of the Answer Sheet. Attempt all questions. Internal choices are given within.

Section A (30 Marks)

A1. Illustrate how the type of work one does influences a person's lifestyle. For example, contrast a farmer, a factory worker, and a school teacher. [5 marks] (CILO 1)

A2. How can we design for self-recovery when self-service failure occurs? [5 marks] (CILO 2)

<OR>

Describe the Porter's five forces for strategic analysis in any service sector [5 marks] (CILO 2)

A3. The management of the Diners Delight franchised restaurant chain is in the process of establishing quality-control charts for the time that its service people give to each customer. Management thinks the length of time that each customer is given should remain within certain limits to enhance service quality. A sample of six service people was selected, and the customer service they provided was observed four times. The activities that the service people were performing were identified, and the time to service one customer was recorded as follows:

	Service Time (in Secs)			
Service Person	S1	S2	S3	S4
1	200	150	175	90
2	120	85	105	75
3	83	93	130	150
4	68	150	145	175
5	110	90	75	105
6	115	65	115	125

(a) Determine the upper and lower control limits for an *X-bar* chart and an *R* -chart with a sample size of 6 and establish the control chart. ($A_2 = 0.48$, $D_3 = 0$, $D_4 = 2$)
(b) After the control chart was established, a sample of six service personnel was observed, and the following customer service times in seconds were recorded: 180, 125, 110, 98, 156, and 190. Is corrective action called for? [5+5=10 marks] (CILO 3)

<OR>

Several complaints recently have been sent to the Gotham City police department regarding the increasing incidence of congestion on the city's streets. The complaints attribute the cause of these traffic tie-ups to a lack of synchronization of the traffic lights. The lights are controlled by a main computer system, and adjusting this program is costly. Therefore, the controllers are reluctant to change the situation unless a clear need is shown. During the past year, the police department has collected data at 1,000 intersections. The data were compiled on a monthly basis as shown below:

Month	Congestion Incidence
Jan	14
Feb	18
Mar	14
Apr	12
May	16

Jun	8
Jul	19
Aug	12
Sep	14
Oct	7
Nov	10
Dec	18

(a) Construct a *p* -chart based on the above data.
(b) Should the system be modified if, during the next 3 months, reports of congestion at these 1,000 intersections indicate the following:

Month	Congestion Incidence
Jan	15
Feb	9
Mar	11

[5+5=10 marks] (CILO 3)

A4. The Service times of different items in Cafeteria is shown in the following table

Sequence	Service Station	Average Service Time (in Secs)
1	Serve Vegetables	20
2	Serve Snacks	30
3	Serve Soup	20
4	Serve Dessert	15
5	Serve Drink	10
6	Collect Money	60

One employee is assigned for each service to serve the customer. Develop an optimized balanced layout by minimizing number of employees, maximizing capacity or minimizing cycle time for following two conditions.
(a) Sequence dependent (Given sequence of service stations to be followed)
(b) Sequence independent (Service stations may be reshuffled) [5*2 =10 marks] (CILO 3)

Section B: Case Study (20 Marks)

Athol Furniture, Inc. (AFI), is a growing regional chain of discount furniture and large-appliance stores. Management has targeted the small city of Bluff Lake as the next location for a retail outlet. Although the total population is currently 21,000, Bluff Lake is expected to grow during the next decade because of increased mining in the surrounding hills. AFI's marketing department did a general analysis of the potential of market expansion into Bluff Lake, but the task of locating the best site for a store has been given to Mr. Carlos Gutierrez. After obtaining the market data on Bluff Lake, Mr. Gutierrez decides it would be very appropriate to utilize the Huff location model in developing a recommendation for the company's management. This is because there are existing competitors and several potential sites under consideration.
Figure 1 depicts map of Bluff Lake showing major streets and highways, the railway (AFI will ship its merchandise into the city by rail from a regional warehouse 800 miles away), Crystal River, Bluff Lake, and the census block groups (numbered 1 through 12). Table 1 gives the number of households average annual income per household, and average annual furniture/large-appliance expenditure per household for each census block group.

Fig. 1: Buff Lake Map

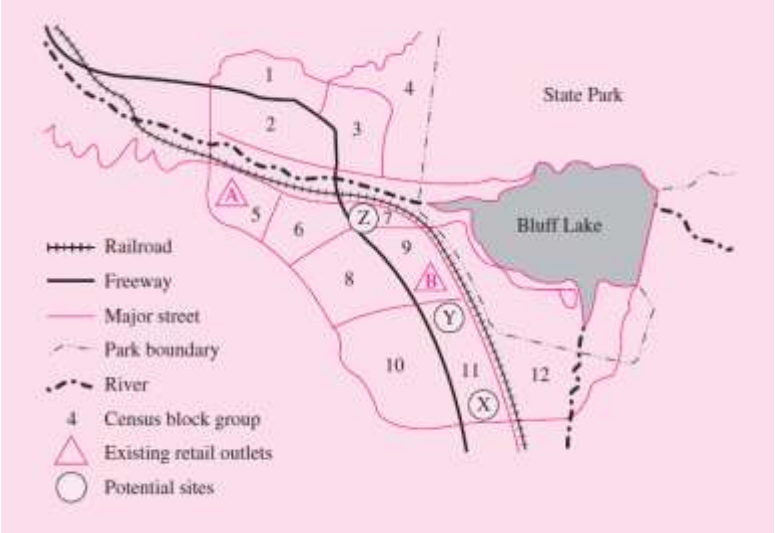

Table 1: Market Data

Census Block Group	Number of Households	Avg. Annual Income	Avg. Annual Furniture/Large-Appliance Expenditures per Household
1	730	65,000–70,000	$180
2	1,130	45,000–50,000	125
3	1,035	80,000–85,000	280
4	635	150,000–over	350
5	160	25,000–30,000	75
6	105	20,000–25,000	50
7	125	20,000–25,000	60
8	470	40,000–45,000	115
9	305	30,000–35,000	90
10	1,755	85,000–90,000	265
11	900	75,000–80,000	215
12	290	150,000–over	370
	7,640		

In Figure 1, the letters A and B show the locations of AFI's existing competitors, and Table 2 indicates the sizes of these existing stores to the nearest 5,000 square feet of sales area. The letters X, Y, and Z in Figure 1 show the possible sites that Mr. Gutierrez feels AFI could use for a retail store. The maximum size limit (i.e., sales area) of each potential location is given in Table 3.

Table 2: Competitors' Store Sizes

Stores	Sales, Area, Sq. ft.
A	10,000
B	15,000

Table 3: Maximum Size Limit of AFI Sites

Site	Maximum Sales Area, Sq. ft.
X	15,000
Y	20,000
Z	10,000

On the basis of average speeds for the main streets and highways obtained from the city's planning department, Mr. Gutierrez has developed a matrix of travel times between the existing and potential retail sites and the center of each census block group. These travel times can be found in Table 4. From experience with other AFI locations, Mr. Gutierrez has developed a fairly accurate portrayal of the relationship between store size (i.e., sales area) and margin on sales, expenses, and net operating profit before taxes. This information is shown in Table 5.

Table 4: Minimum Travel Time between Potential and Existing Sites and Block Groups in Minutes

	Census Block Group											
Site	1	2	3	4	5	6	7	8	9	10	11	12
A	7	5	5	9	1	3	4	5	7	10	14	17
B	10	8	8	10	7	3	3	2	1	4	2	5
X	16	14	14	16	13	8	7	6	4	3	2	2
Y	12	10	10	12	9	5	4	3	2	3	2	4
Z	7	5	5	7	4	2	1	4	3	8	10	13

Table 5: Relationship of Size of Store to Margin on Sales, Expenses, and Net Operating Profit as a Percent of Sales

	Operating Data		
Sales Area, Sq. Ft.	Margin on Sales	Expenses	Net Operating Profit before Taxes
10,000	16.2	12.3	3.9
15,000	15.6	12.0	3.6
20,000	14.7	11.8	2.9

Questions:

Q.1 Utilizing a spreadsheet version of the Huff location model (with $\lambda = 1.0$), recommend a store size and location for AFI. Assuming that AFI does not wish to consider a store that is smaller than 10,000 square feet, assess the store sizes (based on 5,000-square-foot increments) up to the maximum allowable sales area for each potential site.

Q.2 What is the expected annual net operating profit before taxes and expected market share for the outlet you have recommended? Defend your recommendation.

Q.3 Try two other values of _ (e.g., 0.5 and 5.0) to measure the sensitivity of customer travel propensity on your recommended location

Q.4 Briefly state any shortcomings you may perceive in this model. [8+4+5+3 =20] (CILO 2)

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