

Part I: YumPizza initially started to serve all customers without a budget constraint.

- Solve for the optimal pizzeria locations using Excel. How many facilities do you need to cover

all neighborhoods? What is the total cost?

AutoSave Case2_SupplyChain_VeerabhMahadik

Home Insert Draw Page Layout Formulas Data Review View Automate Tell me

Comments Share

APTOS NARROW (BOD... 12 A' A'

B I U Paste

General

Conditional Formatting Format as Table Cell Styles

Insert Delete Format

Sort & Filter Find & Select

Sensitivity Analyze Data

C129 =SUM(C125:L125)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
1			A	B	C	D	E	F	G	H	I	J	Demand	Coverage	Aij*yi						
2		1	1	0	1	0	0	1	1	0	0	0	200	1	2						
3		2	0	1	0	0	1	0	0	0	1	0	200	1	1						
4		3	1	0	1	0	0	1	1	1	0	0	200	1	2						
5		4	0	0	0	1	0	0	0	0	0	1	200	1	1						
6		5	1	0	0	1	1	0	1	1	1	1	200	1	2						
7		6	0	0	0	1	0	0	0	0	0	0	200	1	1						
8		7	1	0	1	0	0	1	0	0	0	0	200	1	1						
9		8	1	0	1	0	0	1	1	0	0	0	200	1	2						
10		9	1	1	0	1	1	0	0	1	1	0	200	1	2						
11		10	0	0	0	1	0	0	0	0	0	0	125	1	1						
12		11	1	0	1	0	0	1	0	0	0	0	125	1	1						
13		12	1	0	1	0	0	1	1	1	1	0	125	1	2						
14		13	0	0	0	1	0	0	0	0	0	1	125	1	1						
15		14	1	1	0	0	1	0	0	1	1	0	125	1	1						
16		15	0	1	0	1	1	0	0	1	1	0	125	1	2						
17		16	1	0	0	0	0	1	1	1	1	0	125	1	2						
18		17	1	0	0	0	0	1	1	1	1	0	125	1	2						
19		18	1	0	0	1	0	0	1	1	0	1	125	1	2						
20		19	1	0	1	0	0	1	0	0	0	0	125	1	1						
21		20	1	1	0	0	1	1	1	1	1	0	125	1	3						
22		21	0	0	0	1	1	0	0	0	0	1	125	1	1						
23		22	1	0	0	1	1	0	1	1	1	1	125	1	2						
24		23	0	0	0	1	1	0	0	0	0	0	125	1	1						
25		24	1	0	0	0	0	1	0	1	1	0	125	1	1						
26		25	1	0	1	0	0	1	0	0	0	0	125	1	1						
27		26	1	0	0	0	0	1	1	1	1	1	125	1	2						
28		27	0	1	0	0	0	0	0	0	0	0	125	1	1						
29		28	0	1	0	0	1	0	0	1	1	0	125	1	1						
30		29	1	0	1	0	0	1	0	0	0	0	125	1	1						
31		30	1	0	0	1	1	0	1	1	1	1	125	1	2						
32		31	0	1	0	0	1	0	0	1	1	0	125	1	1						
33		32	0	0	0	1	0	0	0	0	0	1	125	1	1						
34		33	0	0	1	0	0	1	0	0	0	0	125	1	1						
35		34	1	0	1	0	0	1	0	1	1	0	75	1	1						
36		35	1	0	0	0	0	1	1	1	1	0	75	1	2						
37		36	1	0	0	0	0	0	1	1	0	1	75	1	1						
38		37	1	0	0	0	0	0	1	1	1	1	75	1	1						
39		38	1	0	1	0	0	1	1	1	0	0	75	1	2						
40		39	0	1	0	1	1	0	0	1	1	1	75	1	2						

Part 1 Q1

AutoSave Case2_SupplyChain_VeerabhMahadik

Home Insert Draw Page Layout Formulas Data Review View Automate Tell me

Font: Aptos Narrow (Body) 12, Bold, Italic, Underline, Text Color, Background Color, Paragraph: Wrap Text, Merge & Center, Styles: Conditional Formatting, Format as Table, Cell Styles, Editing: Insert, Delete, Format, Comments, Share

C129 =SUM(C125:L125)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
20		20	1	1	0	0	1	1	1	1	1	0	125	1	3						
21		21	0	0	0	1	1	0	0	0	0	1	125	1	1						
22		22	1	0	0	1	1	0	1	1	1	1	125	1	2						
23		23	0	0	0	1	1	0	0	0	0	0	125	1	1						
24		24	1	0	0	0	0	1	0	1	1	0	125	1	1						
25		25	1	0	1	0	0	1	0	0	0	0	125	1	1						
26		26	1	0	0	0	0	1	1	1	1	1	125	1	2						
27		27	0	1	0	0	0	0	0	0	0	0	125	1	1						
28		28	0	1	0	0	1	0	0	1	1	0	125	1	1						
29		29	1	0	1	0	0	1	0	0	0	0	125	1	1						
30		30	1	0	0	1	1	0	1	1	1	1	125	1	2						
31		31	0	1	0	0	1	0	0	1	1	0	125	1	1						
32		32	0	0	0	1	0	0	0	0	0	1	125	1	1						
33		33	0	0	1	0	0	1	0	0	0	0	125	1	1						
34		34	1	0	1	0	0	1	0	1	1	0	75	1	1						
35		35	1	0	0	0	0	1	1	1	1	0	75	1	2						
36		36	1	0	0	0	0	0	1	1	0	1	75	1	1						
37		37	1	0	0	0	0	0	1	1	1	1	75	1	1						
38		38	1	0	1	0	0	1	1	1	0	0	75	1	2						
39		39	0	1	0	1	1	0	0	1	1	1	75	1	2						
40		40	1	0	1	0	0	1	0	0	0	0	75	1	1						
41		41	1	0	1	0	0	1	0	1	1	0	75	1	1						
42		42	0	1	0	0	0	0	0	0	1	0	75	1	1						
43		43	0	1	0	1	1	0	0	0	0	0	75	1	2						
44		44	0	1	0	0	1	0	0	0	0	0	75	1	1						
45		45	0	0	0	1	1	0	0	0	0	1	75	1	1						
46		46	1	1	0	0	0	1	0	1	1	1	75	1	2						
47		47	1	0	1	0	0	1	0	1	1	0	75	1	1						
48		48	0	1	0	0	0	1	0	1	1	0	75	1	2						
49		49	0	0	0	1	1	0	0	0	0	0	75	1	1						
22			A	B	C	D	E	F	G	H	I	J									
23			Monthly	2800	2200	2200	2200	2500	2000	3000	2500	2300									
24			Yi	0	1	0	1	0	1	0	0	0									
25																					
26																					
27																					
28			Total cost	8900																	
29			Facilities required	4																	
30																					
31																					

Part 1 Q1 Part 1 Q3 Part 2 +

	A	B	C	D	E	F	G	H	I	J	Demand	Coverage	Aij*yi
1	1	0	1	0	0	1	1	0	0	0	200	1	2
2	0	1	0	0	1	0	0	0	1	0	200	1	1
3	1	0	1	0	0	1	1	1	0	0	200	1	2
4	0	0	0	1	0	0	0	0	0	1	200	1	1
5	1	0	0	1	1	0	1	1	1	1	200	1	2
6	0	0	0	1	0	0	0	0	0	1	200	1	1
7	1	0	1	0	0	1	0	0	0	0	200	1	1
8	1	0	1	0	0	1	1	0	0	0	200	1	2
9	1	1	0	1	1	0	0	1	1	0	200	1	2
10	0	0	0	1	0	0	0	0	0	0	125	1	1
11	1	0	1	0	0	1	0	0	0	0	125	1	1
12	1	0	1	0	0	1	1	1	1	0	125	1	2
13	0	0	0	1	0	0	0	0	0	1	125	1	1
14	1	1	0	0	1	0	0	1	1	0	125	1	1
15	0	1	0	1	1	0	0	1	1	0	125	1	2
16	1	0	0	0	0	1	1	1	1	0	125	1	2
17	1	0	0	0	0	1	1	1	1	0	125	1	2
18	1	0	0	1	0	0	1	1	0	1	125	1	2
19	1	0	1	0	0	1	0	0	0	0	125	1	1
20	1	1	0	0	1	1	1	1	1	0	125	1	3

[illegible]

- The given information includes a Distance matrix detailing the time required for delivery from facilities to demand locations, along with Monthly leasing costs associated with the latitude and longitude of these locations. The initial constraint applied is a 15-minute delivery time, utilizing an "IF" formula with 1 for True and 0 for False under Condition 1. This process results in the creation of a potential delivery Distance Matrix. It is determined that facilities B, D, F, and G are viable options for demand coverage, incurring a total cost of \$8900.

- [illegible]

Locations	Constraints	Demands satisfied	Cost	Coverage
BDFG	10 to 4	49	8900	1
BDF	3	48	7200	0.98
BD	2	27	4400	0.55
B	1	14	2200	0.29

Part II: YumPizza agrees that serving all customers may not be a realistic goal. Additionally, YumPizza can spend only \$6, 000 per month for rent.

- How would you suggest that YumPizza change their supply chain strategy? Specifically, what should they choose as an objective function and why?

YumPizza's monthly rent budget is at \$6,000, prompting the consideration of the maximal covering location problem (MCLP) model. This model focuses on maximizing customer coverage while adhering to budget constraints. With the budget limitation in mind, our objective is to maximize the demand met. Additionally, to stay within the \$6,000 budget, we must incorporate the monthly leasing cost as a constraint to prevent exceeding the limit.

- Solve for the optimal pizzeria locations using Excel under the strategy and objective function proposed above. How much neighborhoods does YumPizza now serve? What is the total cost? What are your overall observations?

AutoSave • [Icons] Case2_SupplyChain_VeerabhMahadik

Home Insert Draw Page Layout Formulas Data Review View Automate Tell me

[Paste] [Font Face/A/Size] Aptos Narrow (Bod... 12 [Bold/Italic/Underline/Bullet/Numbering] [Text Color/Background Color]

[Wrap Text] General [Conditional Formatting] [Format as Table] [Cell Styles] [Insert/Delete/Format] [Sum/Count/Max/Min/Average] [Sort & Filter] [Find & Select] [Sensitivity] [Analyze Data]

G132 [Formulas Bar]

	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
29				1	1	1	1	1	1	1	1	1	1	1	125	1	125				
30				1	0	0	1	1	1	0	1	1	1	1	125	2	1	125			
31				0	1	0	0	1	0	0	1	1	1	0	125	0	0	0			
32				0	0	0	1	0	0	0	0	0	0	1	125	1	1	125			
33				0	0	1	0	0	1	0	0	0	0	0	125	0	0	0			
34				1	0	1	0	0	1	0	1	1	1	0	75	1	1	75			
35				1	0	0	0	0	0	1	1	1	1	0	75	1	1	75			
36				1	0	0	0	0	0	0	1	1	1	0	75	1	1	75			
37				1	0	0	0	0	0	0	1	1	1	1	75	1	1	75			
38				1	0	1	0	0	1	1	1	1	0	0	75	1	1	75			
39				0	1	0	1	0	1	0	0	1	1	1	75	1	1	75			
40				1	0	1	0	0	0	1	0	0	0	0	75	1	1	75			
41				1	0	1	0	0	0	1	0	1	1	0	75	1	1	75			
42				0	1	0	0	0	0	0	0	0	1	0	75	0	0	0			
43				0	1	0	0	1	1	0	0	0	0	0	75	1	1	75			
44				0	1	0	0	0	1	0	0	0	0	0	75	0	0	0			
45				0	0	0	0	1	1	0	0	0	0	1	75	1	1	75			
46				1	1	0	0	0	0	1	0	1	1	0	75	1	1	75			
47				1	0	1	0	0	0	1	0	1	1	0	75	1	1	75			
48				0	1	0	0	0	0	1	0	1	1	0	75	0	0	0			
49				0	0	0	0	1	1	0	0	0	0	0	75	1	1	75			
Monthly				2800	2200	2200	2200	2200	2500	2000	3000	2500	2300								
Yr				1	0	0	1	0	0	0	0	0									
Total Cost				5000																	
Facilities				2																	
No.of Locations served				41																	
Demand satisfied				5075																	

Part 1 Q1 Part 1 Q3 **Part 2** +

	A	B	C	D	E	F	G	H	I	J	Demand(Di)	Aij*yi	Zi	Di*Zi
1	1	0	1	0	0	1	1	0	0	0	200	1	1	200
2	0	1	0	0	1	0	0	0	1	0	200	0	0	0
3	1	0	1	0	0	1	1	1	0	0	200	1	1	200
4	0	0	0	1	0	0	0	0	0	1	200	1	1	200
5	1	0	0	1	1	0	1	1	1	1	200	2	1	200
6	0	0	0	1	0	0	0	0	0	1	200	1	1	200
7	1	0	1	0	0	1	0	0	0	0	200	1	1	200
8	1	0	1	0	0	1	1	0	0	0	200	1	1	200
9	1	1	0	1	1	0	0	1	1	0	200	2	1	200
10	0	0	0	1	0	0	0	0	0	0	125	1	1	125
11	1	0	1	0	0	1	0	0	0	0	125	1	1	125
12	1	0	1	0	0	1	1	1	1	0	125	1	1	125
13	0	0	0	1	0	0	0	0	0	1	125	1	1	125
14	1	1	0	0	1	0	0	1	1	0	125	1	1	125
15	0	1	0	1	1	0	0	1	1	0	125	1	1	125
16	1	0	0	0	0	1	1	1	1	0	125	1	1	125
17	1	0	0	0	0	1	1	1	1	0	125	1	1	125

[illegible]

Total Cost	5000													
Facilities	2													
No.of Locations served	41													
Demand satsified	5075													

- Compare with previous solution in Part I where all neighborhoods are covered.

Comments.

On comparing Part II with Part I, despite utilizing the same data for resolution, there are discrepancies in the objective functions, constraints, and limitations between the two cases. The overall cost has decreased from \$8900 to \$5000, and the number of facilities available for delivery has also reduced from 4 to 2. This underlines the importance of prioritizing coverage and considering budget constraints when making supply chain decisions.