



IIT ROORKEE



NPTEL ONLINE
CERTIFICATION COURSE

SUPPLY CHAIN ANALYTICS

Using Excel Solver for Network Optimization

Dr. RAJAT AGRAWAL

DEPARTMENT OF MANAGEMENT STUDIES



Excel Spreadsheet Area for Decision Variables

	A	B	C	D	E	F	G	H	I	J	K
1	Inputs- Costs, Capacities, Demands										
2		Demand Destination Production and Transportation cost per 1,000 units					Fixed Cost for low capacity (Rs,000)	Low Capacity	Fixed Cost for High capacity (Rs,000)	High Capacity	
3	Supply Source	USA	Brazil	Denmark	UAE	Vietnam					
4	USA	50	70	100	120	100	6,000	10	9,000	20	
5	Brazil	70	50	120	150	140	4,500	10	7,000	20	
6	Denmark	120	150	80	100	120	7,000	10	10,000	20	
7	UAE	90	125	100	75	120	4,000	10	6,000	20	
8	Vietnam	150	180	125	100	70	3,500	10	6,000	20	
9	Demand	12	6	14	16	7					
10											
11	Decision Variables										
12		Demand Country- production Allocation					Plants	Plants			
13	Supply Source	USA	Brazil	Denmark	UAE	Vietnam	(1= open)	(1 = open)			
14	USA	0	0	0	0	0	0	0			
15	Brazil	0	0	0	0	0	0	0			
16	Denmark	0	0	0	0	0	0	0			
17	UAE	0	0	0	0	0	0	0			
18	Vietnam	0	0	0	0	0	0	0			
19											

Various Formulae of Model to be Used in Excel Solver

Cell	Cell Formula	Constraint/ Objective Function	Copied to
B28	= B9- SUM (B14: F14)	Constraint (A)	B28: F28
B22	= G14*H4 +H14*J4- SUM(B14:F14)	Constraint (B)	B22:B26
B31	= SUMPRODUCT (B14:F18, B4:F8) + SUMPRODUCT (G14: G18, G4: G8) + SUMPRODUCT (H14: H18, I4: I8)	Objective Function	---

Excel Spreadsheet Area for Decision Variables Including Constraints and Objective Function

	A	B	C	D	E	F	G	H	I	J
1	Inputs- Costs, Capacities, Demands									
2		Demand Destination Production and Transportation cost per 1,000 units					Fixed Cost for low capacity (Rs,000)	Low Capacity	Fixed Cost for High capacity (Rs,000)	High Capacity
3	Supply Source	USA	Brazil	Denmark	UAE	Vietnam				
4	USA	50	70	100	120	100	6,000	10	9,000	20
5	Brazil	70	50	120	150	140	4,500	10	7,000	20
6	Denmark	120	150	80	100	120	7,000	10	10,000	20
7	UAE	90	125	100	75	120	4,000	10	6,000	20
8	Vietnam	150	180	125	100	70	3,500	10	6,000	20
9	Demand	12	6	14	16	7				
10										
11	Decision Variables									
12		Demand Country- production Allocation					Plants	Plants		
13	Supply Source	USA	Brazil	Denmark	UAE	Vietnam	(1= open)	(1 = open)		
14	USA	0	0	0	0	0	0	0		
15	Brazil	0	0	0	0	0	0	0		
16	Denmark	0	0	0	0	0	0	0		
17	UAE	0	0	0	0	0	0	0		
18	Vietnam	0	0	0	0	0	0	0		
19										
20	Constraints									
21	Supply Source	Excess Capacity								
22	USA	0								
23	Brazil	0								
24	Denmark	0								
25	UAE	0								
26	Vietnam	0								
27		USA	Brazil	Denmark	UAE	Vietnam				
28	Unmet Demand	12	6	14	16	7				
29										
30	Objective Function									
31	Cost =									
32										

Invoking Solver to Set Country Wise Configuration

	A	B	C	D	E	F	G	H	I	J
1	Inputs- Costs, Capacities, Demands									
2		Demand Destination Production and Transportation cost per 1,000 units					Fixed Cost for low capacity (Rs,000)	Low Capacity	Fixed Cost for High capacity (Rs,000)	High Capacity
3	Supply Source	USA	Brazil	Denmark	UAE	Vietnam				
4	USA	50	70	100	120	100	6,000	10	9,000	20
5	Brazil	70	50	120	150	140	4,500	10	7,000	20
6	Denmark	120	150	80	100	120	7,000	10	10,000	20
7	UAE	90	125	100	75	120	4,000	10	6,000	20
8	Vietnam	150	180	125	100	70	3,500	10	6,000	20
9	Demand	12	6	14	16	7				
10										
11	Decision Variables									
12		Demand Country- production Allocation					Plants (1= open)	Plants (1= open)		
13	Supply Source	USA	Brazil	Denmark	UAE	Vietnam				
14	USA	0	0	0	0	0	0	0		
15	Brazil	0	0	0	0	0	0	0		
16	Denmark	0	0	0	0	0	0	0		
17	UAE	0	0	0	0	0	0	0		
18	Vietnam	0	0	0	0	0	0	0		
19										
20	Constraints									
21	Supply Source	Excess Capacity								
22	USA	0								
23	Brazil	0								
24	Denmark	0								
25	UAE	0								
26	Vietnam	0								
27		USA	Braz							
28	Unmet Demand	12								
29										
30	Objective Function									
31	Cost =									
32										

Solver Parameters

Set Target Cell:

Equal To: ☐ Max ☒ Min ☐ Value of:

By Changing Cells:

Subject to the Constraints:



	A	B	C	D	E	F	G	H	I	J
1	Inputs- Costs, Capacities, Demands									
2		Demand Destination Production and Transportation cost per 1,000 units					Fixed Cost for low capacity (Rs,000)	Low Capacity	Fixed Cost for High capacity (Rs,000)	High Capacity
3	Supply Source	USA	Brazil	Denmark	UAE	Vietnam				
4	USA	50	70	100	120	100	6,000	10	9,000	20
5	Brazil	70	50	120	150	140	4,500	10	7,000	20
6	Denmark	120	150	80	100	120	7,000	10	10,000	20
7	UAE	90	125	100	75	120	4,000	10	6,000	20
8	Vietnam	150	180	125	100	70	3,500	10	6,000	20
9	Demand	12	6	14	16	7				
10										
11	Decision Variables									
12		Demand Country- production Allocation					Plants	Plants		
13	Supply Source	USA	Brazil	Denmark	UAE	Vietnam	(1= open)	(1 = open)		
14	USA	0	0	0	0	0	0	1.61E-13		
15	Brazil	12	6	2	0	0	0	1		
16	Denmark	0	0	0	0	0	0	-1.4E-13		
17	UAE	0	0	12	8	0	0	1		
18	Vietnam	0	0	0	8	7	0	1		
19										
20	Constraints									
21	Supply Source	Excess Capacity								
22	USA	3.22E-12								
23	Brazil	0								
24	Denmark	-2.8E-12								
25	UAE	0								
26	Vietnam	5								
27		USA	Brazil	Denmark	UAE	Vietnam				
28	Unmet Demand	1.17E-12	0	0	0	0				
29										
30	Objective Function									
31	Cost =	23470								



THANK YOU

