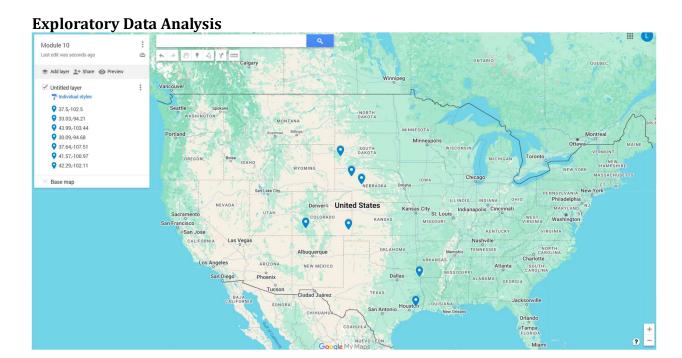
Module 10 - MOLP



Model Formulation

Write the formulation of the model into here prior to implementing it in your Excel model. Be explicit with the definition of the decision variables, objective function, and constraints. For this problem, I am only asking that you perform the model formulation for the MOLP model.

MIN:

17X12+23X14+10X17+9X24+14X26+8X27+7X31+11X32+19X36+16X41+14X42+13 X43+18X45+11X53+16X54+15X56+8X57+23X63+5X64+12X67+15X71+6X73+6X74 +6X76

Model Optimized for Equally Weighted Objectives

Implement your formulation into Excel and be sure to make it neat. This section should include:

Ship	from	to	Transportation Method	Eco-Friendly Binary	Congestion Levels Binary	Cost Per Unit Shipped	Congestion Levels			Nodes	Inflow	Outflow	Netflow	Supply Demand	1	
0	1	2	Slow Steaming Cargo Ships	1	0	17	34	17X12	1	Candy Button Bay	0	9795	-9795	-9795		
0	1	4	Cargo Ships (Heavy Fuel Oil)	1	0	23	29	23X14	2	Fizzwhiz Fjord	1567	0	1567	1567		
0	1	7	Cargo Ships (Heavy Fuel Oil)	1	1	10	84	10X17	3	Fudge Falls	2237.175928	773.175928	1464	1464		
0	2	4	Electrified Rail	0	0	9	26	9X24	4	Licorice Labyrinth	1636.594088	272.594088	1364	1364		
0	2	6	Diesel Rail	1	0	14	25	14X26	5	Pixie Stix Plateau	1976	0	1976	1976	5	
1567	2	7	Diesel Trucks	1	1	8	95	8X27	6	Popping Candy Plains	1591	0	1591	1591		
2237.18	3	1	Cargo Ships (Heavy Fuel Oil)	1	1	7	102	7X31	7	Rainbow Ribbon Roads	5921.229984	4088.22998	1833	1833	1	
0	3	2	Electrified Rail	0	1	11	86	11X32								
0	3	6	Cargo Ships (Heavy Fuel Oil)	1	1	19	94	19X36								
1636.59	4	1	Diesel Rail	1	1	16	74	16X41		Minimize Transportation	\$178,511.56					
0	4	2	Cargo Ships (Heavy Fuel Oil)	1	1	14	82	14X42								
0	4	3	Air Freight	1	1	13	79	13X43								
0	4	5	DieselTrucks	1	1	18	95	18X45		Minimize Distance	\$ 99,581.20					
773.176	5	3	Cargo Ships (Heavy Fuel Oil)	1	1	11	85	11X53								
0	5	4	Electrified Rail	0	1	16	99	16X54								
0	5	6	Diesel Rail	1	1	15	102	15X56		Maximize Eco-Friendlieness	9007.770016					
1202.82	5	7	Diesel Rail	1	1	8	89	8X57								
0	6	3	Diesel Trucks	1	1	23	100	23X63								
272.594	6	4	Diesel Trucks	1	1	5	83	5X64		Minimize Conjestion	9007.770016					
1318.41	6	7	Cargo Ships (Heavy Fuel Oil)	1	1	12	83	12X67		Notes of the control for the control of						
5921.23	7	1	Electrified Rail	0	0	15	44	15X71		Objectives	Totals	Target Value	Deviation	% Deviation	Weight	Weighted Deviation
0	7	3	Electrified Rail	0	1	6	78	6X73		Total Transportation Cost	\$178,511.56	*********	******	0.131345141	1	0.131345141
0	7	4	Wind-powered Ships	0	1	6	77	6X74		Total Distance Traveled	\$ 99,581.20	\$88,020.18	********	0.131345141	1	0.131345141
0	7	6	Diesel Rail	1	0	6	32	6X76		Eco-Friendlieness	9007.770016	7962	\$ 1,045.77	0.131345141	1	0.131345141
								17X12+23X	14+10X	1 Congestion Levels	9007.770016	7962	\$ 1,045.77	0.131345141	1	0.131345141
										MiniMax Variable	0.131345141					

- A text explanation of what your model is recommending

Model with Stipulation

Alter the weights of each objective to add weight to match what matters most to you. Perhaps run a few different scenarios to see how the routes change depending on the weights. When you find a weight mix and solution that satisfies you, please write a justification on why you chose the final model/weights and about how a configured model like yours can be used for scenario planning.

Ship	from	to	Transportation Method	Eco-Friendly Binary	Congestion Levels Binary	Cost Per Unit Shipped	Congestion Level	s		Nodes	Inflow	Outflow	Netflow	Supply Demand		
0	1	2	Slow Steaming Cargo Ships	1	0	17	34	17X12	1	Candy Button Bay	0	9795	-9795	-9795		
0	1	4	Cargo Ships (Heavy Fuel Oil)	1	0	23	29	23X14	2	Fizzwhiz Fjord	1567	0	1567	1567		
0	1	7	Cargo Ships (Heavy Fuel Oil)	1	1	10	84	10X17	3	Fudge Falls	1778.700764	314.7007641	1464			
0	2	4	Electrified Rail	0	0	9	26	9X24	4	Licorice Labyrinth	2955	1591	1364	1364		
0	2	6	Diesel Rail	1	0	14	25	14X26	5	Pixie Stix Plateau	1976	0	1976	1976		
1567	2	7	Diesel Trucks	1	1	8	95	8X27	6	Popping Candy Plains	1591	0	1591			
1778.7	3	1	Cargo Ships (Heavy Fuel Oil)	1	1	7	102	7X31	7	Rainbow Ribbon Roads	5061.299236	3228.299236	1833	1833		
0	3	2	Electrified Rail	0	1	11	86	11X32								
0	3	6	Cargo Ships (Heavy Fuel Oil)	1	1	19	94	19X36								
2955	4	1	Diesel Rail	1	1	16	74	16X41		Minimize Transportation	\$172,893.50					
0	4	2	Cargo Ships (Heavy Fuel Oil)	1	1	14	82	14X42								
0	4	3	Air Freight	1	1	13	79	13X43								
0	4	5	DieselTrucks	1	1	18	95	18X45		Minimize Distance	\$121,935.11					
314.701	5	3	Cargo Ships (Heavy Fuel Oil)	1	1	11	85	11X53								
0	5	4	Electrified Rail	0	1	16	99	16X54								
0	5	6	Diesel Rail	1	1	15	102	15X56		Maximize Eco-Friendlieness	9867.700764					
1661.3	5	7	Diesel Rail	1	1	8	89	8X57								
0	6	3	Diesel Trucks	1	1	23	100	23X63								
1591	6	4	DieselTrucks	1	1	5	83	5X64		Minimize Conjestion	9867.700764					
0	6	7	Cargo Ships (Heavy Fuel Oil)	1	1	12	83	12X67								
5061.3	7	1	Electrified Rail	0	0	15	44	15X71		Objectives	Totals	Target Value	Deviation	% Deviation	Weight	Weighted Deviation
0	7	3	Electrified Rail	0	1	6	78	6X73		Total Transportation Cost	\$172,893.50	\$157,787.00	\$15,106.50	0.095739802	5	0.478699011
0	7	4	Wind-powered Ships	0	1	6	77	6X74		Total Distance Traveled	\$121,935.11	\$ 88,020.18	\$33,914.93	0.385308635	1	0.385308635
0	7	6	Diesel Rail	1	0	6	32	6X76		Eco-Friendlieness	9867.700764	7962	\$ 1,905.70	0.239349506	0	0
								17X12+23X1	4+10X	Congestion Levels	9867.700764	7962	\$ 1,905.70	0.239349506	2	0.478699011
										MiniMax Variable	0.478699011					

Modified Weights:

I elected to make the transportation cost the highest weight, as it would have the highest bearing on the overall total cost of transportation. Next, I decided to limit congestion so that operations would run smoothly. Distance traveled was next in line to ensure that there still exists an element of efficiency within the firm. Lastly, eco-friendliness was ranked in such a low manner, as it is of the least concern for the operating principles of the firm.