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A Hybrid MCDM Approach Based on Fuzzy MEREC–G and Fuzzy RATMI

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Table S2. Example 2

Fuzzy MEREC-G

Combined Fuzzy Decision Matrix*

Alternatives	Criteria														
	Distance (sq. ft)			West disposal site exposure to public			Availability on hand			Sensitivity towards environment			Area covered by PWD site		
	Max			Max			Max			Max			Max		
Site 1	0.1500	0.3000	0.4500	0.1500	0.3000	0.4500	0.1500	0.3000	0.4500	0.5500	0.7000	0.8500	0.1500	0.3000	0.4500
Site 2	0.0000	0.1000	0.2500	0.1500	0.3000	0.4500	0.3500	0.5000	0.6500	0.3500	0.5000	0.6500	0.3500	0.5000	0.6500
Site 3	0.3500	0.5000	0.6500	0.3500	0.5000	0.6500	0.3500	0.5000	0.6500	0.3500	0.5000	0.6500	0.3500	0.5000	0.6500
Site 4	0.3500	0.5000	0.6500	0.3500	0.5000	0.6500	0.3500	0.5000	0.6500	0.3500	0.5000	0.6500	0.3500	0.5000	0.6500
Site 5	0.5500	0.7000	0.8500	0.3500	0.5000	0.6500	0.3500	0.5000	0.6500	0.1500	0.3000	0.4500	0.3500	0.5000	0.6500

* This table is adopted from (Vadivel, S. M., V. Sakthivel, L. Praveena, and V. Chandana. "Apartments Waste Disposal Location Evaluation Using TOPSIS and Fuzzy TOPSIS Methods." In International Conference on Innovations in Bio-Inspired Computing and Ap-plications, pp. 255-263. Cham: Springer Nature Switzerland,**2022**)

Normalized Decision Matrix

Alternatives	Distance (sq. ft)			West disposal site exposure to public			Availability on hand			Sensitivity towards environment			Area covered by PWD site		
	Max			Max			Max			Max			Max		
Site 1	0.1765	0.3529	0.5294	0.2308	0.4615	0.6923	0.2308	0.4615	0.6923	0.6471	0.8235	1.0000	0.2308	0.4615	0.6923
Site 2	0.0000	0.1176	0.2941	0.2308	0.4615	0.6923	0.5385	0.7692	1.0000	0.4118	0.5882	0.7647	0.5385	0.7692	1.0000
Site 3	0.4118	0.5882	0.7647	0.5385	0.7692	1.0000	0.5385	0.7692	1.0000	0.4118	0.5882	0.7647	0.5385	0.7692	1.0000
Site 4	0.4118	0.5882	0.7647	0.5385	0.7692	1.0000	0.5385	0.7692	1.0000	0.4118	0.5882	0.7647	0.5385	0.7692	1.0000
Site 5	0.6471	0.8235	1.0000	0.5385	0.7692	1.0000	0.5385	0.7692	1.0000	0.1765	0.3529	0.5294	0.5385	0.7692	1.0000

The changes in the overall performance of alternatives

Alternatives	Distance (sq. ft)			West disposal site exposure to public			Availability on hand			Sensitivity towards environment			Area covered by PWD site		
	Max			Max			Max			Max			Max		
Site 1	0.3803	0.6049	0.8020	0.3604	0.5733	0.7601	0.3604	0.5733	0.7601	0.2933	0.5106	0.7062	0.2792	0.4988	0.7097
Site 2	0.4876	0.6937	0.8806	0.0269	0.5278	0.7420	0.0227	0.4765	0.6894	0.0239	0.5028	0.7274	0.0088	0.3959	0.6282
Site 3	0.5776	0.7683	0.9478	0.5474	0.7282	0.8983	0.5474	0.7282	0.8983	0.5776	0.7683	0.9478	0.4709	0.6727	0.8745
Site 4	0.5776	0.7683	0.9478	0.5474	0.7282	0.8983	0.5474	0.7282	0.8983	0.5776	0.7683	0.9478	0.4709	0.6727	0.8745
Site 5	0.4876	0.6937	0.8806	0.5058	0.7032	0.8806	0.5058	0.7032	0.8806	0.6322	0.8218	1.0000	0.4266	0.6440	0.8530

Resulting effect and weights of the Fuzzy MEREC-G

Removal Effect

E1			E2			E3			E4			E5		
Max			Max			Max			Max			Max		
2.5106	3.5289	4.4587	1.9879	3.2607	4.1792	1.9838	3.2094	4.1266	2.1046	3.3718	4.3291	1.6564	2.8841	3.9399

Fuzzy Weights

W1			W2			W3			W4			W5		
Max			Max			Max			Max			Max		
0.1194	0.2171	0.4353	0.0945	0.2006	0.4080	0.0943	0.1974	0.4029	0.1001	0.2074	0.4226	0.0787	0.1774	0.3846

Crisp Weights

W1*	W2*	W3*	W4*	W5*
Max	Max	Max	Max	Max
0.2372	0.2175	0.2145	0.2254	0.1955

Fuzzy RATMI

The fuzzy weighted decision-making matrix

Alternatives	Distance (sq. ft)			West disposal site exposure to public			Availability on hand			Sensitivity towards environment			Area covered by PWD site		
	Max			Max			Max			Max			Max		
Site 1	0.0211	0.0766	0.2304	0.0218	0.0926	0.2825	0.0218	0.0911	0.2789	0.0647	0.1708	0.4226	0.0182	0.0819	0.2663
Site 2	0.0000	0.0255	0.1280	0.0218	0.0926	0.2825	0.0508	0.1519	0.4029	0.0412	0.1220	0.3232	0.0424	0.1365	0.3846
Site 3	0.0491	0.1277	0.3329	0.0509	0.1543	0.4080	0.0508	0.1519	0.4029	0.0412	0.1220	0.3232	0.0424	0.1365	0.3846
Site 4	0.0491	0.1277	0.3329	0.0509	0.1543	0.4080	0.0508	0.1519	0.4029	0.0412	0.1220	0.3232	0.0424	0.1365	0.3846
Site 5	0.0772	0.1788	0.4353	0.0509	0.1543	0.4080	0.0508	0.1519	0.4029	0.0177	0.0732	0.2237	0.0424	0.1365	0.3846

The fuzzy magnitude of components' values

Qk			Qh		
0.1309	0.3559	0.9191	0.0000	0.0000	0.0000

Results of the Fuzzy MCRAT method

Alternatives	Vik			Vih			Z11,i			Z22,i			tr(Zi)~			tr(Zi)	Rank
Site 1	0.0769	0.2421	0.6784	0.0000	0.0000	0.0000	0.0101	0.0862	0.6235	0.0000	0.0000	0.0000	0.0101	0.0862	0.6235	0.1630	5
Site 2	0.0809	0.2565	0.7147	0.0000	0.0000	0.0000	0.0106	0.0913	0.6569	0.0000	0.0000	0.0000	0.0106	0.0913	0.6569	0.1721	4
Site 3	0.1053	0.3110	0.8318	0.0000	0.0000	0.0000	0.0138	0.1107	0.7645	0.0000	0.0000	0.0000	0.0138	0.1107	0.7645	0.2035	2
Site 4	0.1053	0.3110	0.8318	0.0000	0.0000	0.0000	0.0138	0.1107	0.7645	0.0000	0.0000	0.0000	0.0138	0.1107	0.7645	0.2035	2
Site 5	0.1151	0.3207	0.8463	0.0000	0.0000	0.0000	0.0151	0.1141	0.7778	0.0000	0.0000	0.0000	0.0151	0.1141	0.7778	0.2082	1

Results of the Fuzzy RAMS technique

Alternatives	Max			Min			Median			Median Similarity				
	Qk~			Qh~			D~			ms(Mi~)			ms(Mi)	Rank
	0.1309	0.3559	0.9191	0.0000	0.0000	0.0000	0.0654	0.1779	0.4596					
	Vik~			Vih~			Di~							
Site 1	0.0769	0.2421	0.6784	0.0000	0.0000	0.0000	0.0385	0.1211	0.3392	0.0837	0.6804	5.1840	1.3316	5
Site 2	0.0809	0.2565	0.7147	0.0000	0.0000	0.0000	0.0405	0.1283	0.3574	0.0881	0.7208	5.4619	1.4055	4
Site 3	0.1053	0.3110	0.8318	0.0000	0.0000	0.0000	0.0526	0.1555	0.4159	0.1145	0.8738	6.3566	1.6611	2
Site 4	0.1053	0.3110	0.8318	0.0000	0.0000	0.0000	0.0526	0.1555	0.4159	0.1145	0.8738	6.3566	1.6611	2
Site 5	0.1151	0.3207	0.8463	0.0000	0.0000	0.0000	0.0575	0.1603	0.4231	0.1252	0.9011	6.4672	1.6994	1

Alternatives rankings according to the Fuzzy RATMI method

Alternatives	Fuzzy MCRAT		Fuzzy RAMS		Majority Index	Rank
	tr*	0.1630	ms*	1.3316	Ei	
	tr-	0.2082	ms-	1.6994		
	tr(Zi)		ms(Mi)			
Site 1	0.1630		1.3316		0.0000	5
Site 2	0.1721		1.4055		0.2009	4
Site 3	0.2035		1.6611		0.8955	2
Site 4	0.2035		1.6611		0.8955	2
Site 5	0.2082		1.6994		1.0000	1