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APPENDIX-A

Table A-1: Detailed results of computational experiments

Problem Class	COV	Instance	R	SQ^1_{ll}	SQ^1	SQ^1_{Ul}	SQ^2_{ll}	SQ^2	SQ^2_{ul}	SQ^3_{ll}	SQ^3	SQ^3_{ul}
D10	0.1	1	790	97.47	97.61	97.76	99.02	99.10	99.18	99.02	99.02	99.10
		2	1314	97.63	97.74	97.84	98.96	99.02	99.08	98.96	99.04	99.10
		3	2795	97.52	97.59	97.67	99.01	99.05	99.09	99.01	98.98	99.02
		4	936	97.39	97.53	97.66	98.97	99.05	99.12	98.97	98.98	99.05
		5	1010	97.53	97.65	97.77	98.96	99.03	99.10	98.96	98.96	99.03
	0.2	1	8874	95.43	95.50	95.58	97.44	97.49	97.55	97.44	98.35	98.41
		2	6155	95.39	95.49	95.58	97.37	97.44	97.51	97.37	98.35	98.41
		3	9591	95.31	95.39	95.47	97.43	97.48	97.54	97.43	98.30	98.35
		4	8325	95.32	95.40	95.48	97.42	97.47	97.53	97.42	98.31	98.37
		5	9226	95.32	95.40	95.48	97.41	97.46	97.52	97.41	98.33	98.38
	0.3	1	15885	93.18	93.26	93.35	95.73	95.79	95.86	95.73	97.42	97.49
		2	5790	93.09	93.23	93.37	95.70	95.81	95.92	95.70	97.39	97.49
		3	11385	93.20	93.30	93.39	95.76	95.83	95.90	95.76	97.42	97.50
		4	15790	93.20	93.28	93.37	95.81	95.88	95.94	95.81	97.45	97.52
		5	8555	93.23	93.34	93.46	95.74	95.83	95.91	95.74	97.47	97.56
	0.4	1	11758	90.93	91.05	91.18	94.04	94.14	94.24	94.04	96.50	96.59
		2	14821	90.93	91.04	91.15	94.02	94.11	94.20	94.02	96.48	96.57
		3	7086	90.98	91.14	91.30	93.97	94.10	94.23	93.97	96.50	96.63
		4	10688	90.97	91.10	91.23	94.02	94.12	94.22	94.02	96.53	96.63
		5	6453	90.96	91.12	91.29	94.03	94.16	94.29	94.03	96.49	96.63
	0.5	1	28535	88.84	88.93	89.03	92.38	92.45	92.53	92.38	95.45	95.53
		2	31910	88.80	88.89	88.98	92.39	92.46	92.54	92.39	95.47	95.54
		3	35122	88.79	88.88	88.96	92.44	92.51	92.57	92.44	95.46	95.53
		4	25241	88.81	88.91	89.01	92.39	92.47	92.55	92.39	95.43	95.52
		5	41098	88.88	88.96	89.04	92.37	92.43	92.50	92.37	95.49	95.55
D20	0.1	1	1299	97.95	98.02	98.10	99.06	99.12	99.18	99.06	100.00	100.00
		2	731	97.94	98.04	98.13	99.07	99.14	99.22	99.07	100.00	100.00

	3	464	97.81	97.93	98.06	99.09	99.19	99.28	99.09	100.00	100.00
	4	763	97.82	97.92	98.02	99.02	99.10	99.18	99.02	100.00	100.00
	5	997	97.93	98.01	98.10	99.03	99.10	99.16	99.03	100.00	100.00
	1	1768	95.46	95.59	95.72	97.89	97.99	98.09	97.89	100.00	100.00
	2	2753	95.40	95.51	95.61	97.88	97.96	98.04	97.88	100.00	100.00
0.2	3	2333	95.47	95.58	95.69	97.81	97.90	97.99	97.81	100.00	100.00
	4	2163	95.50	95.61	95.73	97.95	98.04	98.12	97.95	100.00	100.00
	5	2811	95.53	95.63	95.73	97.93	98.01	98.09	97.93	100.00	100.00
	1	3606	92.88	93.01	93.15	96.63	96.73	96.84	96.63	99.95	100.00
	2	3190	92.86	93.01	93.15	96.59	96.70	96.81	96.59	99.94	100.00
0.3	3	4080	92.79	92.92	93.04	96.56	96.66	96.75	96.56	99.94	100.00
	4	6718	92.93	93.03	93.12	96.62	96.70	96.78	96.62	99.94	100.00
	5	2799	92.85	93.00	93.15	96.49	96.61	96.73	96.49	99.94	100.00
	1	3282	90.40	90.58	90.76	95.12	95.26	95.41	95.12	99.82	99.97
	2	7615	90.39	90.51	90.63	95.21	95.30	95.40	95.21	99.80	99.89
0.4	3	8933	90.43	90.54	90.65	95.23	95.32	95.40	95.23	99.81	99.90
	4	8807	90.29	90.40	90.51	95.20	95.28	95.37	95.20	99.80	99.88
	5	11649	90.37	90.47	90.56	95.24	95.31	95.39	95.24	99.79	99.87
	1	21730	87.81	87.89	87.98	93.67	93.74	93.81	93.67	99.59	99.66
	2	7520	87.69	87.84	87.98	93.68	93.80	93.92	93.68	99.56	99.68
0.5	3	13197	87.71	87.81	87.92	93.68	93.77	93.86	93.68	99.57	99.66
	4	14082	87.79	87.89	88.00	93.66	93.75	93.83	93.66	99.58	99.67
	5	25508	87.85	87.93	88.01	93.75	93.81	93.88	93.75	99.59	99.65
	1	292	97.72	97.83	97.94	98.60	98.68	98.77	98.60	98.25	98.34
	2	219	97.66	97.78	97.91	98.56	98.66	98.77	98.56	98.16	98.26
0.1	3	320	97.70	97.80	97.90	98.65	98.73	98.81	98.65	98.27	98.35
	4	378	97.62	97.71	97.81	98.67	98.74	98.82	98.67	98.21	98.29
	5	188	97.63	97.76	97.89	98.58	98.70	98.82	98.58	98.15	98.27
D50	1	1144	95.55	95.65	95.76	97.47	97.55	97.64	97.47	97.77	97.85
	2	920	95.50	95.61	95.73	97.46	97.56	97.66	97.46	97.77	97.86
0.2	3	870	95.49	95.61	95.74	97.53	97.63	97.72	97.53	97.79	97.89
	4	1731	95.47	95.56	95.65	97.50	97.57	97.64	97.50	97.73	97.80
	5	1562	95.42	95.52	95.61	97.54	97.61	97.69	97.54	97.77	97.84

		1	1769	93.25	93.38	93.50	96.30	96.40	96.50	96.30	97.22	97.32
		2	2777	93.29	93.38	93.48	96.35	96.43	96.50	96.35	97.22	97.29
	0.3	3	2984	93.35	93.44	93.54	96.33	96.41	96.49	96.33	97.26	97.34
		4	1392	93.30	93.44	93.59	96.29	96.41	96.52	96.29	97.22	97.34
		5	3288	93.33	93.42	93.51	96.33	96.41	96.48	96.33	97.20	97.28
		1	4106	91.07	91.17	91.28	95.06	95.15	95.23	95.06	96.61	96.69
		2	5114	91.16	91.26	91.35	95.13	95.21	95.29	95.13	96.63	96.71
	0.4	3	2811	91.16	91.29	91.42	95.02	95.13	95.23	95.02	96.57	96.68
		4	4037	91.18	91.28	91.39	95.18	95.27	95.36	95.18	96.67	96.76
		5	5778	91.18	91.27	91.35	95.13	95.21	95.28	95.13	96.63	96.70
		1	7162	88.97	89.06	89.16	93.76	93.85	93.93	93.76	95.85	95.93
		2	5764	88.92	89.02	89.13	93.72	93.81	93.90	93.72	95.81	95.90
	0.5	3	7528	88.87	88.96	89.05	93.80	93.88	93.96	93.80	95.82	95.90
		4	2965	88.86	89.01	89.16	93.83	93.95	94.08	93.83	95.90	96.03
		5	9477	88.94	89.02	89.11	93.82	93.89	93.96	93.82	95.87	95.94
		1	154	97.48	97.60	97.71	98.36	98.44	98.52	98.36	98.40	98.49
		2	153	97.51	97.61	97.71	98.32	98.40	98.48	98.32	98.35	98.43
	0.1	3	158	97.40	97.52	97.63	98.34	98.42	98.50	98.34	98.29	98.37
		4	163	97.44	97.55	97.66	98.32	98.41	98.49	98.32	98.40	98.49
		5	351	97.48	97.56	97.64	98.39	98.45	98.51	98.39	98.38	98.44
		1	837	95.37	95.46	95.55	97.37	97.44	97.51	97.37	98.04	98.11
		2	754	95.40	95.50	95.59	97.34	97.41	97.49	97.34	98.04	98.12
	0.2	3	428	95.39	95.52	95.65	97.41	97.50	97.60	97.41	98.07	98.16
		4	315	95.28	95.43	95.57	97.30	97.42	97.54	97.30	97.93	98.05
D100		5	599	95.35	95.46	95.57	97.36	97.44	97.53	97.36	98.03	98.12
		1	1317	93.01	93.12	93.22	96.22	96.30	96.39	96.22	97.49	97.57
		2	1508	93.15	93.25	93.35	96.29	96.37	96.44	96.29	97.59	97.66
	0.3	3	820	93.14	93.27	93.40	96.17	96.27	96.38	96.17	97.53	97.64
		4	1833	93.22	93.30	93.39	96.21	96.28	96.35	96.21	97.59	97.66
		5	1370	93.02	93.12	93.22	96.27	96.35	96.43	96.27	97.50	97.58
		1	1489	90.82	90.95	91.08	95.03	95.14	95.24	95.03	97.00	97.10
	0.4	2	1983	90.91	91.02	91.13	94.96	95.05	95.14	94.96	97.03	97.12
		3	2202	90.84	90.94	91.05	94.98	95.07	95.15	94.98	96.95	97.04

	4	2537	90.83	90.93	91.03	94.97	95.05	95.13	94.97	96.97	97.05
	5	1990	90.87	90.98	91.08	95.01	95.10	95.19	95.01	97.00	97.09
	1	2744	88.59	88.71	88.82	93.70	93.80	93.89	93.70	96.36	96.45
	2	4492	88.68	88.77	88.86	93.65	93.73	93.80	93.65	96.35	96.42
0.5	3	2716	88.57	88.68	88.80	93.66	93.76	93.85	93.66	96.34	96.43
	4	4245	88.67	88.76	88.85	93.64	93.71	93.79	93.64	96.36	96.44
	5	5134	88.66	88.74	88.82	93.73	93.80	93.86	93.73	96.35	96.42

COV = Coefficient of variation

R = Total number of replications

SQ^1, SQ^2, SQ^3= Service level for service types 1, 2, and 3, respectively.

SQ^1_{ll}, SQ^2_{ll}, SQ^3_{ll} = Lower limit of confidence interval of service level for service types 1, 2, and 3, respectively.

SQ^1_{ul}, SQ^2_{ul}, SQ^3_{ul} = Upper limit of confidence interval of service level for service types 1, 2, and 3, respectively.

LIST OF PUBLICATIONS

Journal Publications

Chouksey, A., Agrawal, A. K., & Tanksale, A. N. (2022). A Hierarchical Capacitated Facility Location-Allocation Model for Planning Maternal Healthcare Facilities in India. Computers & Industrial Engineering, 107991. DOI: https://doi.org/10.1016/j.cie.2022.107991

Chouksey, A., Agrawal, A. K., & Tanksale, A. N. (2022). An optimization and simulation hybrid approach for maternal healthcare facility location-allocation in the Indian context. International Journal of Operational Research, 43(1/2), 42-64. DOI: 10.1504/IJOR.2022.121489.

Manuscript Under Review

Chouksey, A., Agrawal, A. K., & Tanksale, A. N. (2022). Accelerated Bender's Decomposition Algorithm and Hybrid Heuristics for Multi-Period Planning of Maternal Healthcare Facilities in India. European Journal of Operational Research (under review).

Chouksey, A., Agrawal, A. K., & Tanksale, A. N. (2022). Comparative Performance Analysis of Some Metaheuristics in Solving Large Scale Indian Maternal Healthcare Planning Problem. Opsearch (under review).

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