

Supplementary material for Kim and Lee, “Collection network design with capacity planning in reverse logistics: Static and restricted dynamic model”, *Engineering Optimization*, 2018.

Supplementary Table. Literatures on reverse logistics network design.

Articles	Mathematical models ^a	Time variant/invariant		Network types	Solution approaches	Capacity planning	
		Static	Dynamic			Modular capacity	Time adjustment capacity ^b
Pugh (1993)	MILP		✓	Solid waste management	HARBINGER based heuristic		
Jayaraman, Guide, and Srivastava (1999)	0-1 MILP	✓		Remanufacturing network	Commercial solver (GAMS)		
Fleischmann et al. (2001)	MILP (Multiple-level)	✓		Recovery network for forward and reverse logistics	Commercial solver (CPLEX)		
Jayaraman, Patterson, and Rolland (2003)	0-1 MILP	✓		Refurbish network	Randomized greedy heuristic		
Schulmann, Engels, and Rentz (2003)	MILP (Multiple-level)	✓		Recycling network	Commercial solver (GAMS)	✓	
Bautista and Pereira (2006)	0-1 IP	✓		Waste management	B&B algorithm Genetic algorithm GRASP algorithm		
Min, Ko, and Ko (2006a)	0-1 MILP	✓		Product return network	Genetic algorithm		
Ko and Evans (2007)	MILP (Multiple-level)		✓	Distribution network for forward and reverse logistics	Genetic algorithm		✓ (expansion)
Kara, Rugrungruang, and Kaebnick (2007)	Conceptual model	✓		Product recovery network	Simulation		
Lieckens and Vandaele (2007)	MINLP	✓		Stochastic reverse logistic network	Genetic algorithm	✓	
Lu and Bostel (2007)	0-1 MIP (Multiple-level)	✓		Remanufacturing network	Lagrangian heuristics		
Salema, Barbosa-Povoa, and Novais (2007)	MILP	✓		Recovery distribution network with demand uncertainty	B&B algorithm		
Wang and Yang (2007)	MILP	✓		Waste management	Commercial solver (CPLEX)		
Wojanowski, Verter, and Boycai (2007)	Continuous model	✓		Recovery network	Continuous modeling approach		
Aras and Aksen (2008)	MINLP	✓		Collection center network	Tabu search		
Aras, Aksen, and Tanugur (2008)	MINLP	✓		Collection center network with vehicle capacity	Tabu search		
Lee and Dong (2008)	SMILNP		✓	Product recovery network with uncertainty for forward and reverse logistics	Sample average approximation scheme with SA		

Supplementary Table (Continued)

Articles	Mathematical models	Time variant/invariant		Network types	Solution approaches	Capacity planning	
		Static	Dynamic			Modular capacity	Time adjustment capacity
Mansour and Zarei (2008)	MILP		√	Product recovery network	Multiple start search algorithm	√	
Min and Ko (2008)	MILP		√	Product repair network	Genetic algorithm		√ (expansion)
Pati, Vrat, and Kumar (2008)	MIGP	√		Paper recycling network	Commercial solver (LINDO)		
Cruz-Rivera and Ertel (2009)	0-1 MILP	√		End-of-Life vehicle collection network	SITATION software (applied facility location problem)		
El-Sayed, Afia, and El-Kharbotly (2010)	SMILP (Multiple-level)		√	Reuse network for forward and reverse logistics	Example solved from the mathematical model		
Alumur et al. (2012)	MILP		√	Remanufacturing network	Commercial solver (CPLEX)		
Ghiani et al. (2012)	IP	√		Waste management	Two-phases heuristic		
Kim and Lee (2013a)	IP	√		Collection network design	B&B algorithm B&B based heuristic		
Kim and Lee (2013b)	IP		√	Collection network design	Multi-stage B&B heuristic Modified Drop heuristic		
Tari and Alumur (2014)	MILP		√	Waste management	Commercial solver (CPLEX)	√	
Toso and Alem (2014)	MILP		√	Solid waste management	Commercial solver (CPLEX)		
This study	IP	√	√	Collection network design	B&B based heuristic Multi-stage heuristic	√	

^a IP: Integer Programming, MILP: Mixed Integer Linear Programming, MINLP: Mixed Integer Nonlinear Programming, SMILP: Stochastic Mixed Integer Linear Programming, MIGP: Mixed Integer Goal Programming

^b Time adjustment capacity include capacity relocation, capacity expansion, and capacity reduction