Abstract

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Optimal placement and reallocation of facilities play a crucial role in competitive markets, particularly when existing firms are already established and new entrant firms try to enter. Existing studies either only allow the entrant firm to make facility location decisions or allow the entrant firm to first make its decisions and then the existing firm responds to the decisions taken by the entrant firm. This thesis proposes a multi-objective optimization framework to guide both existing and entrant firms in selecting facility locations to maximize their individual revenues. A central agency guides both the firms in facility placement and reallocation decisions. The optimization formulation considers limits on the number of facilities that each firm can operate and capacities of facilities. The developed optimization formulation is a multi-objective mixed integer non-linear problem (MOMINLP). To solve the proposed optimization problem, this thesis proposes a greedy algorithm and a genetic algorithm. These algorithms are compared with an exact method. Computational experiments are conducted on hypothetical datasets and results show that the greedy algorithm provides solutions close to the optimal within a reasonable computation time. Sensitivity analysis are also performed on parameters such as the number of facilities a firm can operate, open and reallocate, and also on the number of facility locations for both the firms.