Facility location models development to maximize total service area

ABSTRACT

This paper present and discuss the new developed model to maximize total service area of a fixed number of facilities. Two greedy algorithms, Greedy Adding (ADD) and Greedy Adding with Substitution (GAS), were applied to solve the optimization problem of the Maximal Service Area Problem (MSAP). The MSAP is a discrete model where a specified number of facilities that achieve the best objective function value of the model are selected out of a finite set of candidate sites. In this study the determination of Fire stations location in Jakarta Selatan, Indonesia, were chosen for simulation. The shape of total service area covered by emergency facilities such as fire stations and ambulances is influenced by the road accessibility. The determination process requires lots of manual intervention in trying to improve the total service area. The two algorithms managed to reach better coverage than the coverage of existing fire stations with the same number of fire stations within the same travel time. The ADD managed to reach the coverage of 82.81% and GAS did 83.20%., while the existing fire stations only reach 73.69%.w. The approach undertaken in conventional facility location models had only defined a facility's service area simply by a circular coverage. And therefore, it can be concluded that, as such the conventional approach is appropriate for facilities which are not influenced by topographical and road network barriers.