

A Bicriteria Approach To Hub Location Problems

Maria da Graça Costa

Departamento de Economia e Gestão
Escola Superior de Ciências Empresariais
Instituto Politécnico de Setúbal
Portugal
gcosta@esce.ips.pt

Maria Eugénia Captivo*

Universidade de Lisboa, Faculdade de Ciências
Centro de Investigação Operacional
Portugal
mecaptivo@fc.ul.pt

João Clímaco

Faculdade de Economia da Universidade de Coimbra
INESC – Coimbra
Portugal
jclimaco@inescc.pt

Hub location problems generally arise in situations where traffic must be transported from its point of origin to its destination, but when it is expensive or impossible to use exclusive links to each origin-destination pair. Hubs act as consolidation, transfer and distribution centres for traffic. Their advantage is that, by gathering the traffic, they enable economies of scale ensuring lower transportation costs. This problem arises in many applications, such as: telecommunication networks, airline transportation, mail distribution and emergency services.

A bicriteria single allocation hub location problem is presented. We suggest a different approach to the Capacitated Single Allocation Hub Location Problems by introducing a second objective function that tries to minimize the time for processing the flow entering the hubs. In this preliminary study, the capacity constraints are discarded and the reasonability of the hubs flow charge is analysed for the different non-dominated solutions obtained during the interactive search. To generate non-dominated solutions an interactive decision-aid method developed for bicriteria integer linear programming problems is used. Our bicriteria model is tested on the AP data set for 10, 20, 25 and 40 nodes, analysing the correspondent non-dominated solutions set. The increased information provided by the non-dominated solutions of the bicriteria model when compared to the unique solution given by the capacitated hub location model is highlighted. The use of the proposed bicriteria model will allow the decision maker to consider the model as a support for his/her decision, enabling the reflection on the different non-dominated solutions, allowing negotiation with all the actors of the decision process and tolerating hesitations and ambiguities.

Keywords: hub location, bicriteria problems, interactive methods.

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