

# **A Multiple Criteria Approach for Defining the Ambulance System Structure: A Case Study**

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## **Abstract**

The definition of the Ambulance Emergency Medical System Structure (EMSS) is an important issue in the healthcare sector. The EMSS consists of the number and location of ambulance bases required to satisfy an established service level or optimize a certain criterion. An important effort of academic research has been realized to determine the optimal EMSS based on the optimization of single objectives. However, as evidenced by the different criteria utilized in the vast literature developed, this issue could be discussed under several criteria simultaneously such as demand coverage and ambulance response time concepts. In this paper, we will undertake a multicriteria approach for supporting decision makers to determine their most preferred EMSS. This approach is applied to the Monterrey metropolitan operations of the Mexican Red Cross. Results of the application are provided.

## **Keywords**

Ambulance location; response time; demand covering; ambulance availability

## **Biographies**

**Edgar Aurelio Marco Granda** is a full professor of the Department of Engineering of the Universidad de Monterrey. He holds a PhD of Industrial Engineering from ITESM. He has 18 years of professional experience in logistics, operations and supply chain in several Mexican companies. He has taught for 5 years courses on industrial engineering and logistics in the Universidad de Monterrey, ITESM, UMIN and Universidad Autónoma de Nuevo León. As a consultant, he has carried out projects on logistics and supply chain for different company in México.

**Bernardo Villarreal** is a full professor of the Department of Engineering of the Universidad de Monterrey. He holds a PhD and an MSc of Industrial Engineering from SUNY at Buffalo. He has 20 years of professional experience in strategic planning in several Mexican companies. He has taught for 20 years courses on industrial engineering and logistics in the Universidad de Monterrey, ITESM and Universidad Autónoma de Nuevo León. He has made several publications in journals such as Mathematical Programming, JOTA, JMMA, European Journal of Industrial Engineering, International Journal of Industrial Engineering, Production Planning and Control, International Journal of Logistics Research and Applications, Industrial Management and Data Systems and the Transportation Journal. He is currently a member of the IIE, INFORMS, POMS and the Council of Logistics Management.

**Jenny Díaz Ramírez** is a CUM LAUDE Industrial Engineer just graduated from Universidad de Monterrey (UEM). She has participated on several projects such as the Improvement of the routing operations of a leading convenience store firm. She also applied Lean Thinking principles for Improving the Productivity of several metal assembly lines for a Mexican metal mechanic company. Currently, she has started to work at a Mexican firm leader in the manufacturing of frozen and refrigerated food as a transportation and traffic analyst. Andrea is a member of the IIE and ASQ Societies.