Fuzzy Logic Based Multi-Criteria Selection of Pharmaceutical Merchants

A Thesis Submitted in Partial Fulfillment of the Requirements for the Master Degree in Information Technology

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Abstract

In today’s rapid growth of healthcare services and the dynamic challenges facing healthcare organizations, it is extremely essential for decision makers to have reliable decision support tools in order to make fast, right and precise decisions. One of the decision-making parts is supplier selection in pharmaceutical merchants. Supplier selection is a multi-criteria decision-making process that deals with the optimization of conflicting objectives such as price, quality, and delivery. If it is not supported by a suitable system, this would be a complex and time consuming process.

In this thesis, two methodologies are utilized as the core system to build the multi-criteria decision-making, Fuzzy Logic and Analytical Hierarchy Process (AHP). Ministry of Health (MOH) in the Kingdom of Bahrain was used as the real case study example for this thesis. The study initiated with purchasing behavior and supplier selections literature review. Subsequently, a qualitative research method of interview and quantitative research method of questionnaires were utilized to identify the evaluation criteria used by experts in MOH. After identifying the criteria of supplier selection from the literature and the one in practice in MOH, data is fed to the constructed fuzzy expert system in MATLAB programming environment and with AHP in Microsoft Excel spread sheets. Based on the results, supplier with the total highest score becomes the most suitable alternative. In addition, sensitivity analysis is carried out using AHP method; the result shows that the developed AHP model is more stable. A number of recommendations are made to MOH, aiming to improve the procurement practices and trying to include modern business practices, using IT and modern technological tools in healthcare procurement practices.