

# **SUPPLY CHAIN NETWORK DESIGN: A MATHEMATICAL VERSUS SPREADSHEET MODELING APPROACH**

*Aber Elsaleiby, College of Business, Purdue University Calumet, 2200 169<sup>th</sup> Street, Hammond, IN, 46323, [aber.elsaleiby@purduecal.edu](mailto:aber.elsaleiby@purduecal.edu)*

*Raida Abuizam, College of Business, Purdue University Calumet, 2200 169<sup>th</sup> Street, Hammond, IN, 46323, [abuizam@purduecal.edu](mailto:abuizam@purduecal.edu)*

## **ABSTRACT**

The objective of this paper is to approach a supply chain network design both mathematically and using the spreadsheet optimization modeling. The developed mathematical model considers a multi-echelon supply chain with multiple product families. The problem is to identify the best combination of manufacturing plants and warehouses to serve particular demand zones. An advantage of the proposed models over those existing in the literature is that it can be applied at both the strategic level and the operational level. At the strategic level, the proposed model can be used to decide what facilities to open and operate given their constrained capacities. Operationally, the model can refine managers' capabilities to decide what demand zones to satisfy at the most economical manner. The proposed approach helps managers to take supply chain related decisions in a practical way deploying what if analysis. It will provide the managers with a decision making tool to deal with the uncertain real life situations. Lingo and spreadsheet analysis will both be used to solve the problem for different scenarios. The computational analysis and results will be presented and discussed in this paper.