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Mathematical Model of Supply Chain Order Management Relying on Robust Optimization and Activity-Based Costing

Ahmad Jafanejad¹, Adel Azar², Seyed Abbas Ebrahimi³

Abstract: One of the most important functions of manufacturers and producers related to supply chain issues and decisions is management of supply chain orders. But in this way, there are several questions such as (a) what is the best order portfolio between received orders? (b) what are various decision scenarios under uncertainty? Indeed, these are the questions we want to answer in this paper. The purpose of this research is designing the mathematical model of supply chain orders management belongs to an Automakers Company. For this reason, we use both robust optimization and activity based costing method to gain more accurate and better solutions. Due to cost structure used in this model and complexity of cost objects as well as uncertainty of some parameters, we change this model to a robust model to obtain more reliable results. Finally, to assess the validity of the model and quality of solutions, we use simulation techniques. Findings show the model is valid and applicable to determine orders portfolio and various decision scenarios.

Keywords: *Activity-based costing, Order portfolio, Robust mathematical model, Simulation, Uncertainty.*

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Multilevel Measuring of Efficiency in Banking Industry (Network Slacks-Based Measure Approach)

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Abstract: Conventional data envelopment analysis (DEA) models in the performance evaluation are based on black box thought, so that inputs in the boxes (decision making units) are converted into outputs. One of the drawbacks of these models is the neglect of internal structure, intermediate products or linking activities; also the actual transforming process generally isn't modeled explicitly. According to the multi-stage structure of the banking industry; in this research, after pointing out black box (aggregation) and separation approaches, needs for inclusion of internal process of the decision making units (DMUs) expressed and a slacks-based network data envelopment analysis model is introduced and used in performance evaluation of the banking industry. The major merit of slacks-based measure is its ability to provide suitable efficiency measures, especially for weakly efficient units. Among the findings of this research is that in the structures with linking and networking effects, using the black box and separation approaches, don't produce actual assessment of performance and should be used network models.

Keywords: *Black Box, Banking Industry, Network Data Envelopment Analysis (NDEA), Separation Approach, Slacks-Based Measure (SBM).*

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Modeling and Simulation of Urban Traffic Network Using Colored Petri Nets

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Abstract: Management and control of vehicle traffic on the network of streets and cross-sections is part of urban traffic control system. The aim of this research is to propose an operations research method to model the urban traffic control system, in order to be used in improving urban traffic. Scientific contribution of this article is on the policy setting in scheduling traffic lights in lubricating urban traffic flow using colored Petri nets. In this research, Colored Petri Nets is used as a modeling and improvement tool. Part of Bushehr urban traffic network is modeled using the proposed method. In order to investigate different improving scenarios, discrete event simulation is applied. Results show that the proposed method is a suitable technique to improve the performance of urban traffic system. Based on the system performance measures, a suitable setting is proposed to improve the traffic flow.

Keywords: *Colored petri nets, Simulation, Traffic signal, Urban traffic.*

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Designing a Framework for Determining the Optimal Strategy Combination on SWOT Analysis by Fuzzy Net Present Value and Game Theory

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Abstract: Organizations to remain competitive and dynamic business environment require a correct analysis of the internal situation and their own environment In order to obtain a variety of appropriate strategies. One of the most widely used management tools in the analysis and strategic planning is SWOT that formulated The strategies based on an analysis of internal and external factors. However, SWOT analysis along with advantages, it also has some limitations, such as assuming independence between strategic and ranking strategic factors and strategies. This paper covers SWOT analysis limits by combining it with the fuzzy net present value and is fuzzy Shaply value and provides a conceptual framework of combination these three tools. Finally the conceptual framework also implements in a power Co and determined the optimal combination strategy of this organization.

Keywords: *Net present value, Shaply value, Strategy, SWOT analysis Game Theory.*

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Causal Modeling of Relationships between Criteria for EFQM Excellence Model in TOSE'E TA'AVON Bank

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Abstract: Organizations that participate in the competition, had to enter the paths are called Excellence. So through extensive efforts undertaken by quality experts, various patterns as models of excellence are established and used as one of the most common ways of organizations success. The main purpose of this paper is to "assess the causal model between criterias of business excellence model at Tose'e Ta'avon Bank" and the secondary objective is to "measure excellence of Tose'e Ta'avon Bank". This study in terms of subject is practical and development, and in terms of data collection is correlation and survey. With regard to the relationships between the criterias of excellence model, the relationships between these criterias is calculated by structural equation. According to the procedure outlined, for this study is used from PLS and SPSS software. The data collected at the end of 93 and the first six months of 94. On the other hand, the excellence model used is the 2013 version. In this study population are managers and senior experts of Tose'e Ta'avon Bank.

Keywords: *Causal model, EFQM excellence model, Organizational excellence, Quality awards, TOSE'E TA'AVON bank.*

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Extension of Malmquist Productivity Index using Targeted Trade-offs in Data Envelopment Analysis

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Abstract: If an external evaluation of decision making units (DMUs) is available based on some background information of them, we can estimate it using some defined trade-offs in DEA models. In this paper, we firstly select optimal combination of trade-offs to maximize correlation between external and internal evaluation of DMUs and then we set up the targeted trade-off production possibility set by using the selected optimal trade-offs. Considering this PPS as a based technology in the Malmquist index, we can extend the malmquist productivity index. In the following, a new factor as “external evaluation factor” is introduced so we can present new decompositions of Malmquist index. Finally, using a numerical example we illustrate the extended Malmquist index and its decompositions.

Keywords: *Data envelopment analysis, GTDEA model, Malmquist index, Targetted Trade-offs.*

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A Hybrid Fuzzy Prioritization - PROMETHEE Model for Supplier Selection

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Abstract: Evaluation and selection of suppliers is one of the important pillars in supply chain management. Thanks to the fuzzy sets theory, researchers try to provide several methods to deal with uncertainty which is constituted by vague situations in supplier selection problem. However, one of the biggest shortcomings in these methods is complexity in fuzzy weighting calculation. To avoid this problem in the traditional fuzzy weighting methods, this paper is used a fuzzy ranking method. This method does not require defuzzifying of fuzzy numbers and standardizing of weighted vector. Instead, this method can provide best weighted vector using a fuzzy optimization model without relying on experts' paired comparisons. The combination of this method and PROMETHEE ranking method provides an effective model for solving the supplier selection problem. Application of this model in Iran auto industry has shown its effectiveness.

Keywords: *Auto industry, Fuzzy prioritization method, PROMETHEE, Supplier selection, Supply chain.*

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A Model for the Design of Blood Products Supply Chain at the Time of the Earthquake Disaster Considering the Transfer from the Other Provinces (Case Study: Tehran Blood Transfusion Network)

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Abstract: Up to now, blood products in various conditions such as severe bleeding, organ transplants were essential for human. One of the situations that lead to increase in needs of blood products highly and blood transfusion network is faced with problem to supply of them, when a disaster for example an earthquake happens. In this paper, for approaching to the real world, a mathematical model for designing of blood products supply chain in disaster time is proposed and due to inability of affected city to supply of needed blood products, the issue of transferring of these products from adjacent provinces has considered. The model is bi-objective and the corrected ϵ -constraint method is used to solve it. The case study about the earthquake disaster in Tehran has studied using the data of blood transfusion network. The results show considering the possibility of blood products transfusion from other provinces can help to decision makers in order to increase the service to applicants of blood products in disaster time.

Keywords: *Blood products supply chain, Corrected ϵ -constraint method, Earthquake disaster, Fuzzy mathematical programming, Tehran blood transfusion network.*

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