

Preventive Maintenance Scheduling with Integer Programming and Constraint Programming

Majid Esmaelian¹, Hajar Bakran²

Abstract: Preventive maintenance scheduling is to perform a series of tasks that prevents or minimizes production breakdowns and improves the reliability. Mathematical models have been developed to solve the preventive maintenance scheduling problem. There are several limitations in the prior work in this area of research. Craft combinations are assumed to be given. The craft combination problem concerns the computation of all combinations of assigning multi skilled workers to accomplishing a particular task. Some research provides heuristic and artificial intelligence approach for integrated solution for the preventive maintenance scheduling problem with multi skilled workforce constraints. The purpose of this study is scheduling the preventive maintenance with constraint programming. Constraint programming is used in varied range of techniques such as artificial intelligence and operations research. Two novel preventive maintenance scheduling model bases on constraint programming are formulated to automatically produce the optimal solution and craft combination in multiple resource problems. Preventive maintenance scheduling problem with multiple and single resource solved with mathematical programming and constraint programming. The solution of these two approaches compared in numerical examples.

Keywords: *Constraint programming, Constraint satisfaction problem, Mathematical programming, Preventive maintenance scheduling.*

1. Assistant Prof., Dep. of Management, Faculty of Economic & Administrative Sciences, University of Isfahan, Isfahan, Iran

2. MSc. Industrial Management, Faculty of Economic & Administrative Sciences, University of Isfahan, Isfahan, Iran

Submitted: 13 / January / 2014

Accepted: 29 / June / 2014

Corresponding Author: Majid Esmaelian

Email: Majid_Esmaelian@yahoo.com

Efficiency Security Margin of Decision Making Units in Data Envelopment Analysis Model (Case Study: Departments in University of Science and Culture)

Saeid Ehdaie¹, Mohammad Reza Mehregan²

Abstract: One of the most applicable methods to measure efficiency is using Data Envelopment Analysis (DEA) models. DEA measures efficiency for some homogenous units (units with the same inputs and outputs) and determines efficient and non-efficient units. Since the evaluated efficiency for each unit is a relative value, it is clear that each unit tries to improve its performance and preserve (or even improve) its ranking in comparison with others. The distance between efficiency values of the units makes a security margin for them. This concept is first introduced by the authors and named Efficiency Security Margin (ESM). In this paper, in addition to illustrating the concept and the motivation for it, an algorithm is proposed to measure the ESM of departments in University of Science and Culture (USC).

Keywords: *Data Envelopment Analysis, Efficiency, Sensitivity Analysis, Efficiency Security Margin, University Departments.*

1. Assistant Prof., Dep. of Industrial Management, Faculty of Human Sciences, University of Science and Culture (USC), Tehran, Iran

2. Prof., Dep. of Industrial Management, Faculty of Management, University of Tehran, Tehran, Iran

Submitted: 26 / April / 2014

Accepted: 02 / September / 2014

Corresponding Author: Saeid Ehdaie

Email: saeid@ehdaie.com

Development of Technology Acceptance Model in Iranian Banking (Case Study: Refah Bank of Semnan Province)

Jafar Razmi¹, Seyed Abdollah Heydaeriyeh², Ali Shahabi³

Abstract: Development of new technologies is one of the key success factors in most today's organizations. But this point must also be considered that the acceptance of new technologies does not happen at the moment; it is a process that takes shape over time, and if the usage is repeated, it can be concluded that acceptance has been successful. Besides the systematical review of the researches conducted on technology acceptance model since it's development by Davis so far in this paper, there has been an effort regarding basic TAM model variables and adding more neglected variables including habit, the ability to use and advertisements, a technology acceptance model has been presented considering social and cultural situation in Iran. A questionnaire was designed to test the assumptions, and after being completed by the staff of information Technology action Refah bank, it was analyzed using fuzzy dematel. Research result shows the fact that continuous use of a technology (like electronic banking) leads to an increase in habit of use that itself results in an increase of usage, indeed there will be a strong reinforcing loop. On the other hand, habit of using previous system (traditional banking) is of the main obstacles to users willing to use new technologies in Iran.

Keywords: *Advertisement, Electronic banking, Fuzzy dematel, Habit, Ability to Use, Technology acceptance model.*

1. Prof., Dep. of Industrial Engineering, University of Tehran, Iran

2. Assistant Prof., Industrial Management, Islamic Azad University, Semnan Branch, Iran

3. Ph.D. Candidate, Technology Management, Science and Research University, Tehran, Iran

Submitted: 04 / December / 2013

Accepted: 08 / June / 2014

Corresponding Author: Jafar Razmi

Email: jrazmi@ut.ac.ir

Exploring the Strategic Priorities and their Relationship with Resource Based Competitive Advantages (Case Study: Firms in Rasht Industrial Complex)

Mohammad Rahim Ramezani¹, Mohsen Akbari², Mohammad Esmailzadeh³

Abstract: With the rapid changes in international environments, it's very hard to sustain the corporate competitive advantage. Knowing the competitive priorities leads the managers to a better understanding of corporate strategies in the future. The globalization pressure and the rapid changes in local markets have affected the firms' competitive advantages. Having a clear understanding of competitive priorities can help manufacturing firms sustain their competitive advantage. Basing the Resource Based View (RBV), as the foundations of competitive advantages, this paper collects data through questionnaire filled in by 142 managers of manufacturing firms in Rasht industrial complex. Applying EFA and CFA, 8 factors are distinguished as the strategic priorities which effect competitive advantages of these firms including quality, cost, delivery, flexibility, environmental preservation, innovation, technical knowledge and customer focus. Customer centricity had the highest and cost had the lowest effect on achieving competitive advantage among them.

Keywords: *Competitive advantage, Resource based view, Strategic priorities.*

1. Assistant Prof., Faculty of Literature & Human sciences, Guilan University, Rasht, Iran

2. Assistant Prof., Faculty of Literature & Human sciences, Guilan University, Rasht, Iran

3. MSc. Student, Industrial Management, Faculty of Literature and Human Science, University of Guilan, Rasht, Iran

Submitted: 10 / December / 2013

Accepted: 08 / July / 2014

Corresponding Author: Mohammad Esmailzadeh

Email: esmailzadehmohammad@yahoo.com

Robust and Stable Scheduling for FJSP under Random Machine Breakdown by Use of Genetic Algorithm and Simulation

Mostafa Zandieh¹, Ehsan Ahmadi²

Abstract: Current research addresses finding robust and stable schedule for the flexible job shop problem under machine breakdown. We have used simulation to investigate the effect of machine breakdown. Two-stage of metaheuristic algorithm is developed to generate robust and stable schedule and is integrated with simulation algorithm. Because makespan is primitive objective of every scheduling problem, in the first stage of integrated algorithm, makespan is improved and in the second stage linear combination of stability, robustness and makespan is proposed. In our proposed model we provide condition that scheduler can decide which objective is important than the others, then scheduling scheme can be generated based on this decision. In the second stage, we have investigated four type of coefficient in combination cost function, and our experiment shows that it is possible to achieve high stability and robustness measures without sacrificing much from the makespan level. Genetic and differential evolution algorithms are used in proposed model then a statistical hypothesis test is conducted to compare the performance of them.

Keywords: *Differential evolution algorithm, Flexible job shop problem, Genetic algorithm, Machine breakdown, Makespan, Robust, Stable.*

1. Associate Prof., Dep. of Industrial Management, Shahid Beheshti University, Tehran, Iran

2. MSc. of Industrial Management, Shahid Beheshti University, Tehran, Iran

Submitted: 24 / November / 2013

Accepted: 26 / May / 2014

Corresponding Author: Ehsan Ahmadi

Email: Ahmady.Ehsan@gmail.com

Determinants of Framework for Assessing the Sustainability of Food Supply Chains Using Fuzzy Analytic Network Process (Case Study: Selected Meat Production Companies of Mazandaran)

Abdolhamid Safaei Ghadikolaei¹, Zahra Gholamrezatabar Divkolaei²

Abstract: In order to achieve the research objectives, the determinants of framework for assessing the sustainability of food supply chains, literature reviewed and then sustainability assessment framework of Food and Agriculture Organization (FAO) introduced as a research basic model. Localization and verification of research criteria by using the Delphi technique and calculation the importance degree of the criteria by applying fuzzy ANP were done. To do so, the opinions of 12 experts, including 5 academic experts in the field of sustainable development and 7 experts from Meat Production Companies of Kalleh Amol, Zarbal and Production and packaging of Toyur Filleh was used. Research findings showed that Physical, psychological, social employees and greenhouse gas emissions by weight of (0.0787) and (0.0632) are the most important criteria in order to achieve the sustainable supply chain. Also, Among the Sub-criteria of governance and economic dimensions, respectively, certified production and food safety from the perspective of experts have earned the highest degree of importance. This framework can be used to evaluate the different parts of the food supply chain and assess their sustainability.

Keywords: *Sustainability Assessment, Food Supply Chain, Fuzzy Analytic Network Process.*

1. Assistant Prof., Industrial Management, University of Mazandaran, Babolsar, Iran

2. MSc. Student, Industrial Management, University of Mazandaran, Babolsar, Iran

Submitted: 06 / October / 2013

Accepted: 08 / June / 2014

Corresponding Author: Zahra Gholamrezatabar Divkolaei

Email: Zahra.gholamrezatabar@gmail.com

Trade-Off Selection by Generalized Trade-Off Data Envelopment Analysis Model

Mohammad Reza Alirezaee¹, Mohammad Reza Rafiee Sani²

Abstract: Determination of Trade-Off, which they are feasible and similar variations on all of Decision Making Units (DMU), is important issue in Data Envelopment Analysis (DEA). In this paper, we select these Trade-Offs based on an external evaluation of DMUs such that the correlation between external evaluation and technical evaluation resulted from DEA model is maximized. In fact, we sift the Trade-Offs and select only those of them that result higher correlation between external and technical evaluation of DMUs. We introduce a generalized DEA models that it select combination of Trade-Offs for the purpose of maximizing between the two assessments. Finally, we show the result of this model in case study that it returns Human Development Index.

Keywords: *Data Envelopment Analysis, GTDEA Model, Trade-Off Selection.*

-
1. Assistant Prof., Dep. of Applied Mathematics, Iran University of Science & Technology, Tehran, Iran
 2. Ph.D. Candidate Applied Mathematics, Iran University of Science and Technology, Tehran, Iran
-

Submitted: 20 / January / 2014

Accepted: 31 / May / 2014

Corresponding Author: Mohammad Reza Rafiee Sani

Email: mr_rafiee@just.ac.ir

Development of Balanced Scorecard Framework Based on an Integrated Approach of Cause and Effect Diagram, Interpretive Structural Modeling (ISM) and Analytic Network Process (ANP)

Gholamreza Kordestani¹, Mozhde Ghasemi²

Abstract: Balanced Scorecard is a strategic Evaluation Tool. Reviewing of the relevant literature indicate that regardless of significant improvement of conceptual and theoretical dimension of this framework, its implementation faces with some difficulties, specially based on quantitative approach. The purpose of this paper is to propose an integrated qualitative and quantitative approach for development of balanced scorecard (BSC) based on a manufacturing firm case study. This paper illustrates how to integrate the cause and effect diagram, Interpretive Structural Modeling (ISM) and Analytic Network Process (ANP) for determining strategic objectives and performance measures and their weights in balanced scorecard. Research results show that financial objectives have the most deriving power and learning and growth objectives are the most dependent objectives. Moreover, the customer perspective is the most preferred one, and higher weights are assigned to these objectives: increase asset utilization in financial perspective, production with competitive price in customer perspective, identification the customer groups needs and satisfied them in internal business process and active participation in the society in learning and growth perspective.

Keywords: *Analytic Network Process, Balanced Scorecard Framework, Cause and Effect diagram, Interpretive Structural Modeling.*

1. Associate Prof., Faculty of Social Sciences, Imam Khomeini International University, Gazvin, Iran

2. MSc., Faculty of Social Sciences, Imam Khomeini International University, Gazvin, Iran

Submitted: 22 / January / 2014

Accepted: 08 / July / 2014

Corresponding Author: Mozhde Ghasemi

Email: Mozhde.ghasemi@yahoo.com

Designing Hierarchical Model for Risk Mitigation in Project Supply Chain Based on Meta-Synthesis (Case Study: Fars Gas Company)

Ali Mohamadi¹, Ali Naghi Mosleh Shirazi², Mohammad Bagher Ahmadi³, Payam Shojaei⁴

Abstract: According to gas development in most provinces in recent years and the expansion of gas transfer pipeline in parallel, paying attention to project supply chains and related risks is necessary more than past. Due to specific structure of project supply chain based on government regulations, this article is aimed at presenting a model to mitigate risks on projects supply chain in State gas companies. In order to do that, we have used a mixed methodology approach in this research. According to Meta-synthesis and content validity, risk mitigation strategies are identified and classified. Moreover, by using Interpretive Structural Modeling (ISM), mutual relationships and the degree of influences of each strategy on each other are recognized. Results show that managers must attend to those strategies that have high driving power and low dependency than low driving power and high dependency. As a result, by concentrate on key variable, supply chain risks can be mitigated effectively.

Keywords: *Content Validity, Interpretive Structural Modeling (ISM), Meta-synthesis, Project Supply Chain Risks (PSCR), Risk mitigation strategies*

1. Associate Prof. Industrial Management, University of Shiraz, Shiraz, Iran

2. Associate Prof. Industrial Management, University of Shiraz, Shiraz, Iran

3. Associate Prof. Operation research, University of Shiraz, Shiraz, Iran

4. Ph.D. Candidate, Systems Management, University of Shiraz, Shiraz, Iran

Submitted: 19 / December / 2013

Accepted: 16 / April / 2014

Corresponding Author: Payam Shojaei

Email: pshojaei@yahoo.com

A Cognitive Map of Causal Relationship between Supply Chain Management Practices, Supply Chain Enablers and Supply Chain Performance: a Fuzzy Approach

Mohammad Modares Yazdi¹, Hossein Safari², Behnam Ajdari³

Abstract: Nowadays we know effective supply chain management a key to business success. Therefore, supply chain managers use many practices for SCM effectiveness and many tools as their enablers. Nevertheless, literature about causal relations between SC enablers and SCM practices and performance is scarce. This study reports a cognitive mapping of causal relationships between SCM practices, SC enablers and SC performance based on expert's knowledge. To do so, first Q-sort procedure operated to find a verified list of SCM practices and SC enablers in Iran. Then fuzzy cognitive mapping methodology performed with a new fuzzy approach without need of defuzzification throughout the process. This approach resulted in a cognitive map of fuzzy causal relationship. Final causal model depicts causal impacts of SC enablers on SCM practices and SCM practices on SC performance indicators and their severity.

Keywords: *Fuzzy Cognitive Map, Supply chain enabler, Supply chain management practice, Supply chain performance.*

1. Prof., Dep. of Industrial Engineering, University of Sharif, Tehran, Iran

2. Assistance Prof., Dep. Of Industrial Management, University of Tehran, Iran

3. PhD. Production and Operations Management, University of Tehran, Iran

Submitted: 19 / October / 2013

Accepted: 05 / May / 2014

Corresponding Author: Behnam Ajdari

Email: bajdari@ut.ac.ir