

## ABSTRACTS

### **Non-dominated Sorting Genetic Algorithm-II to Solve Multi Objective Resource-constrained Project Scheduling Problem with Time-cost Trade-off**

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Scheduling plays an important role in project management. However, in addition to providing suitable scheduling, constraints during project implementation should also be noted. This paper proposes bi-objective resource-constrained project scheduling model with the objectives of minimizing project completion time, as well as minimizing the leveling cost of the used resources, in accordance with the employer demands and the contractor developed. To better study this model performance, a real case study related to the topic, were selected. Since the proposed research problem has been proven to be NP-hard as well as large-scale case study, after analyzing the landscape, genetic algorithm to solve problem were offered. Finally, the results of solving real-world algorithms were compared with the results. Results show that the model and algorithm can be used in other similar projects as well.

**Keywords:** Non-dominated sorting Genetic algorithm (NSGA-II), Resource constrained project scheduling problem (RCPS), Resource leveling.

### **A Robust Optimization Model for Aggregate Production Planning with Postponement Policy**

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The perishable products prices will drop significantly after specified periods, for example a season. Hence, over-production or shortage of such products is associated with loss of profit, respectively. In this paper, optimal aggregate production planning, is determined for the production of perishable products such as seasonal clothing, New Year gifts, calendars and almanacs by postponement policy in uncertainty conditions. The production process for these products is proposed to be divided into two phases, with applying the postponement concept. So, there are three production activities, including direct production, production of semi-finished products, and final assembly. A robust optimization model to solve aggregate production planning for these products will be developed, and the set of data will be used for model validation. The paper model can be used to solve real-world problems of aggregate production planning in an uncertain condition.

**Keywords:** Aggregate production planning, Perishable products, Postponement policy, Robust optimization, Uncertainty.

### **Modeling and Solving a Multi-product Economic Order Quantity Problem with Imperfect Items and Emergency Buy or Repair Options**

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In this paper, it has been proposed a multi-product economic order quantity (EOQ) model, assuming the presence of some

imperfect items. They are inspected 100 percent as they are delivered, and defective items are withdrawn. We do not access to supplier to replace the imperfect items with perfect one. So for meeting the demand, there are two options for imperfect items: buy or repair. In buy option, we sell the imperfect items in second market with lower price, and then buy the imperfect items from local supplier with higher price; but in repair option, we will send the imperfect items to repairing workshop, and after they are delivered from repair facility, they are sold as perfect items. There are also some limitations in available budget and warehouse space, and thus we should determine the economic order quantity for each item by considering these limitations. Additional in repairing option, we have some constraints for repairing rate. In the proposed model, the shortage is not allowed, and we have considered this issue in employing alternatives. This paper extends the supposed assumes by Jaber et al. The Proposed problem is a Mixed Integer Non-Linear problem (MINLP). This field of problems are NP-Hard, and they are solved by Meta heuristic algorithms, but they can be solved by exact methods in small scale. So, the proposed problem in this paper is solved by exact method. We also solved numerical examples, and applied the sensitivity analysis for important parameters.

**Keywords:** Economic order quantity, Emergency buy, Exact method, Repair.

### **Developing a Stochastic Model to Establish a Relief Operations Network after Natural Disasters**

**(Case study: A Probabilistic Earthquake in Tehran City)**

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In recent decades, there is a remarkable increase in natural disasters because of population growth, climate change, and systems integrations, which have led to many casualties (death and injuries) around the world. Therefore, an integrated mathematical model is needed to simultaneously deal with all different issues before and after natural disasters. In this paper, we develop an integrated stochastic model for relief operations supply chain, which has two decisions types. First stage decisions include locating regional warehouses and determine pre-position amount of commodities in each warehouse. Second stage decision includes emergency network design, and determines each commodity flow in the network. The objective function is to minimum the total cost of the relief supply chain. Finally, in order to validate the model efficiency, a case-study of Tehran earthquake scenarios with real data of casualties is analyzed.

**Keywords:** Crisis management, Distribution network design, Emergency supply chain, Facility location, Two-stage stochastic programming.

### **A Model Inventory / Production of Single Vendor and Single Buyer by Considering Shortage and Rate of Deterioration, Lead Time Uncertainty Based Approach the Dempster-Shafer Theory** **S. Masoudi, A. Mirzazadeh\***

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In the real world, there is much uncertainty. The stochastic, fuzzy, fuzzy-stochastic, and evince methods, have been used for considering these uncertain conditions. The fuzzy method, as the most common one, has been broadly used in this direction. Yet fuzzy may not consider all of the uncertain conditions, such as unassigned, incomplete

and interval data. Therefore, using evidence theory has been considered as the proposed approach to issues that are the interval basis, and also it is suitable for low data. In this paper, a continuous inventory model is presented with a single vendor, and a single buyer in a state of shortage, where deterioration rate is considered for the goods, and the demand is used as a log-normal. Also, lead time and deterioration rate, are considered uncertain based on Dempster-Shafer theory. The proposed model objective is minimizing the inventory system's total cost. The model is solved by several numerical examples, and finally, the sensitivity problem is analyzed.

**Keywords:** Evidence theory, Integrated inventory model, Shortages, Uncertain lead time, Uncertain deterioration rate.

#### **A Fuzzy Expert System for Policy Making on Roads Pavement Maintenance**

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Roads are one of the fundamental infrastructures for nations' development, and their maintenance is of utmost importance. However, roads are subject to gradual deterioration due to vehicles' continual run, climate change, and miscellaneous damages. Hence, road management centers in various countries, design and analyze a range of maintenance policies depending on road conditions through continuous monitoring. While deciding the time and type of road maintenance, has been traditionally done selectively by experts, regarding the large number of fragments in road networks, repeated and non-algorithmic nature of the decision making process, as well as the

need for high precision to avoid over-budgeting, this task should be performed preferably by means of decision support systems. In order to determine appropriate actions for maintaining road fragments, pavement assessment indices must be measured at first, and then the right policy for maintaining each fragment or the whole road network must be planned based on the estimated maintenance costs and the allocated budget. In this paper, a fuzzy expert system is developed as a decision support system to assist road maintenance managers in their decision process by enhancing the speed and precision of policy making.

**Keywords:** Expert system, Fuzzy inference engine, Pavement management, Road maintenance policy.

#### **A New Fuzzy Approach to Determine the Best Method for the Installation of Marine Pipelines**

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Selecting a method for installing marine pipelines, is a major challenge for decision-makers in oil industry. In this paper, in order to choose the best method of installing marine pipelines, a new fuzzy hybrid approach is proposed. In the proposed approach, first the indices and sub-indices are determined by experts, and their weights are calculated by using fuzzy DEMATEL-ANP method. Then, by the calculated weights, and using a fuzzy multi-objective linear programming model, the best installation method is determined according to the systematic and functional constraints. To demonstrate the proposed approach efficiency, a case study has been solved by using this approach, and the

result has been confirmed by the experts. The proposed approach, provides the oil industry managers with a useful tool for increasing accuracy and ease to choose the method of installation marine pipelines.

**Keywords:** Fuzzy DEMATEL-ANP, Fuzzy multi-objective liner programming, The installation of marine pipelines.