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This paper provides an efficient computational approach to solve a mixed integer programming (MIP) model developed for calculating the parameters of an (R,S) policy in a finite horizon with non-stationary stochastic demand and service level constraints. Given the replenishment periods, we characterize the optimal order-up-to levels for the MIP model and use it to guide the development of a relaxed MIP model, which can be solved in polynomial time. Extensive numerical tests show that our method dominates the MIP solution approach and can handle real-life size problems in trivial time.

2 - Multi-Product Single-Stage Lot Sizing with Random Yield, Imperfect Inspection, Process Compressibility, and Partial Backordering

D. Moradinezhad, industrial engineering, iran university of science and technology, no. 9, Zamani Alley, Nejatollahi Ave, Karimkhan St., Tehran, Tehran, Iran, Islamic Republic Of, dmcatonia@gmail.com, *M.b. Aryanezhad, E. Noorollahi, M. Karimi-Nasab, Seyed Mohammad Ghoreyshi*

Production planning with real world assumptions is a complicated issue for production managers. This paper develops an economic production quantity model for a multi-product single-stage production system under several working conditions / assumptions. The proposed model is proposed to determine decision variables such as cycle length, batch size of each product type for every production run, backorder, regular production rate, and rework rate simultaneously. Computational experiences induce that both model and the algorithm have high performance even in the worst cases.

3 - Heuristic approaches for a practical lot splitting and scheduling problem

Carina Pimentel, Departamento de Produção e Sistemas, Universidade do Minho, Campus de Gualtar, Portugal, 4710-057, Braga, Braga, Portugal, carina@dps.uminho.pt, *Filipe Alvelos, António Duarte, J. M. Valério de Carvalho*

In this talk we present some heuristic approaches for a real world lot splitting and scheduling problem of a Textile factory. The problem consists of finding a weekly production plan for the knitting section of the company, establishing the quantities to produce of each component (organized in one or several lots), and where and when (starting/completion times) to produce them. Two important objectives to achieve are on time delivery of products and minimum levels of work-in-process inventory. We present some results for a set of randomly generated instances based on real world data.

4 - Multi-plant, multi-period and multi-item capacitated lot-sizing problem in beverage industry

Luis Guimarães, DEMEGI, FEUP, Portugal, luis.santos.guimaraes@gmail.com, *Bernardo Almada-Lobo*

In some process industries joint lotsizing and scheduling is known to be vital in order to achieve feasible and effective production plans. Moreover, when facing a multi-plant scenario coordination between plants can make a substantial difference towards more efficient planning. Inspired by a real case-study in the beverage industry we develop a novel formulation and a new heuristic for the multi-plant, multi-period and multi-item capacitated lotsizing problem where transfers between plants are allowed and sequence dependent setup times and costs are considered in a rolling horizon approach.

■ MB-35

Monday, 10:40-12h00

6.2.46

Soft OR and Problem Structuring Methods I

Stream: Soft OR and Problem Structuring Methods

Invited session

Chair: *Colin Eden*, Management, University of Strathclyde, 199 Cathedral Street, G4 0QU, Glasgow, United Kingdom, colin@gsb.strath.ac.uk

1 - Enabling Politically Feasible Agreements: what is a group?

Colin Eden, Management, University of Strathclyde, 199 Cathedral Street, G4 0QU, Glasgow, United Kingdom, colin@gsb.strath.ac.uk, *Paul Nutt, Fran Ackermann*

Involving many group participants meets, (i) the need to tap into a range of different areas of expertise and perspectives, and (ii) the importance of gaining ownership for the outcome(s) among all those who can influence the implementation of agreements. This presentation discusses these issues.

2 - Problem structuring for investing in an uncertain future

Colin Eden, Management, University of Strathclyde, 199 Cathedral Street, G4 0QU, Glasgow, United Kingdom, colin@gsb.strath.ac.uk

Developing an appropriate problem structure for public policy issues that have very long term consequences (20-30yrs) has particular challenges. This presentation discusses the issues and possibilities in undertaking such a task.

3 - Using the Theory of Constraints to resolve conflicts in a large public hospital

Vicky Mabin, Victoria Management School, Victoria University of Wellington, PO Box 600, Wellington, 6140, Wellington, New Zealand, vicky.mabin@vuw.ac.nz, *Sally Babington, Vanessa Caldwell, Julie Yee*

Hospitals typically struggle to meet demand for services within limited budgets. Significant and long-standing tensions exist. This paper provides an analysis of a large public hospital using the Theory of Constraints, to build an understanding of the many cause and effect and necessity relationships that exist in such complex organisational settings. In this case, the root cause of the long-standing conflicts in the hospital system are mapped, solutions suggested, tested and implementation planned.

4 - Systematic and Comprehensive Supply Chain Environmental Management

Joana M. Comas Marti, TOM, EPFL, Station 5, 1015, Lausanne, Switzerland, joana.comas@epfl.ch, *Ralf W. Seifert*

Stakeholders are increasingly demanding businesses to manage environmental issues taking a supply chain or life cycle approach. Supply chain environmental management (SCEM) has arisen as a result. We contribute to the field with a framework for the systematic and comprehensive definition and assessment of SCEM strategies. We structure it in 3 dimensions: what, why and where, i.e. the action taken, the environmental impact being addressed with it, and the supply chain or life cycle stage where that impact takes place. We apply this framework to assess 12 sustainability leaders in 6 sectors.

■ MB-36

Monday, 10:40-12h00

3.1.05

Fuzzy Goal Programming 1

Stream: Fuzzy Systems, Neural Networks & Artificial Intelligence

Invited session

Chair: *Mariano Jimenez-Lopez*, Economía Aplicada I, University of the Basque Country, Plaza de Oñati 1, 20018, San Sebastian, Spain, mariano.jimenez@ehu.es

1 - A Fuzzy Multi-objective Approach for Master Planning in Ceramic Tile Supply Chains

Josefa Mula, Business Management, Polytechnic University of Valencia, Escuela Politécnica Superior de Alcoy, Plaza Ferrándiz y Carbonell, 2, 03801, Alcoy, Alicante, Afghanistan, fmula@cigip.upv.es, *David Peidro, Mareva Alemany, Francisco Lario Esteban*

We propose a fuzzy multi-objective linear programming (FMOLP) approach to model a centralized replenishment, production and distribution problem for ceramic tile supply chains. We also present an interactive solution methodology to convert this FMOLP model into an auxiliary crisp single-objective linear model and to find a preferred compromise solution in an interactive fashion. For illustration purposes, an example based on modifications of real-world industrial problems is presented.