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IEEE Technology Management Council

The IEEE International Conference on **Industrial Engineering and Engineering Management**

IEEM2011

6 to 9 December 2011, Singapore Furama RiverFront Hotel www.IEEM.org

ORGANIZED BY:

IEEE Singapore Section

IEEM 2012 5 to 8 DECEMBER, HONG KONG www.ieem.org

The IEEE International Conference on Industrial Engineering and Engineering Management

(Deadline for submission: 1 June 2012)



- ii Welcome Message
- 2 Organizers & Committees

Session Information

- 4 Floor Plan
- 5 Conference Highlights
- 6 Keynote Presentations
- 9 Speaker Guides
- 10 Program Overview
- 11 Sessions Schedules
- 31 Abstracts
- 86 Author Index

Services

- 90 Useful Info
- 91 What to do and where to go in Singapore



CONFERENCE VENUE

Furama Riverfront Hotel, Singapore 405 Havelock Road, Singapore 169633 Main Tel: (65) 6333 8898 Main Fax: (65) 6733 1588 Website: http://www.furama.com/riverfront

WELCOME MESSAGE BY THE CONFERENCE CHAIRS



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Min Xie Organizing Chair City University of Hong Kong, Hong Kong and National University of Singapore, Singapore



Szu Hui Ng Program Committee Chair National University of Singapore Singapore



Roger Jiao Program Committee Chair Georgia Institute of Technology USA

WELCOME MESSAGE BY THE CONFERENCE CHAIRS

It is our great pleasure to welcome you to the 2011 IEEE International Conference on Industrial Engineering and Engineering Management. After having it in Hong Kong in 2009 and Macau in 2010, the IEEM conference is back in Singapore where it started.

As in the past years, we have received many submissions and each paper was sent to 3-4 reviewers. The rigorous review process has helped to maintain a high standard for this conference We would like to thank the technical program committee members and the author-reviewers for their help in the review process.

IEEM conference is truly an international event with about 50 countries/regions represented each time. We also have three prominent keynote speakers and a meet-the-editors panel for participants to discuss publication and research issues.

The conference is grateful to all authors for your interests and contributions. The supports from Singapore Management University, National University of Singapore and Nanyang Technological University are also greatly appreciated.

Finally, we wish all the participants a fruitful conference. To those overseas, we hope that you enjoy your stay in Singapore.

Arnoud de Meyer, General Chair, Singapore Management University Min Xie, Organizing Committee Chair, City University of Hong Kong and National University of Singapore Szu Hui Ng, Program Committee Chair, National University of Singapore Roger Jiao, Program Committee Chair, Georgia Institute of Technology GENERAL CHAIR Arnoud De Meyer, Singapore Management University, Singapore

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CONFERENCE VENUE FLOOR PLAN



Level 5 Floor Plan - Mercury Rooms



CONFERENCE HIGHLIGHTS

	1	l	l
Tuesday 06-Dec-11	12:00 - 18:30	Delegate Arrival, Registration, Pre-conference Tour, Workshop and Welcome Reception	Foyer - Level 3
	14:00-17:00	Pre-conference Tour "Singapore Port Terminals" (Tour departs 14:00 sharp. Please meet at hotel lobby and present ticket to board bus)	Meet at Hotel Lobby, Level 1
	15:00 –16:30	Workshop: "Technology Innovation Management: an Editor's Perspective" by: Prof. Jonathan D. Linton, Editor-in-Chief of Technovation	Mercury III, Level 5
	16:30-18:30	Welcome Reception (High Tea)	Mercury I & II, Level 5
Wednesday 07-Dec-11	07:30 - 08:50	Registration (Re-opens 10:30 and closes 17:00), Morning Coffee/Tea	Foyer - Level 3
	09:00-10:30 09:10-09:50	Opening Remarks & Keynote Presentations Keynote: "2011 - A Service Odyssey" by Dr Daniel Berg, Distinguished Research Professor of Engineering , University of Miami, USA	Venus I & II, Level 3
	09:50-10:30	Keynote: "Reliability Management in New Product Development" by Prof DNP Murthy, Professor - School of Mechanical and Mining Engineering, The University of Queensland, Australia	
	10:30 - 11:00	Coffee/Tea Break with Snacks	Foyer - Level 3
	11:00 - 12:30	AM Concurrent Sessions	Venus I, II & III, Level 3 Jupiter I, II & III, Level 3
	12:30 - 13:30	Lunch Buffet- *Kintamani - Level 3: If select "Muslim Meal" option The Square - Level 2: If select "non-Muslim Meal" option	Please present meal tickets at gate
	13:30 - 15:00	PM Concurrent Sessions	Venus I, II & III, Level 3 Jupiter I, II & III, Level 3
	15:00-15:30	Coffee/Tea Break with Snacks	Foyer - Level 3
	15:30 - 17:30	PM Concurrent Sessions	Venus I, II & III, Level 3 Jupiter I, II & III, Level 3
Thursday 08-Dec-11	08:00 - 08:50	Registration (Re-opens 10:30 and closes 17:00), Morning Coffee/Tea	Foyer - Level 3
	09:00 - 10:30 09:00 - 09:40	Keynote Presentation followed by "Meet-the-Editors" Session Keynote: "Employment and Productivity, a Paradox for Industrial Engineers" by Professor Mitchell M. Tseng, Chair Professor, Department of Engineering and Logistics Management, The Hong Kong University of Science and Technology	Venus I & II, Level 3
	10:20 11:00	Coffee/Tee Preak with Speaks	Forcer Longl 2
	11:00 - 12:30	AM Concurrent Sessions	Venus I II & III Level 3
	11.00 12.00		Jupiter I, II & III, Level 3
	12:30 - 13:30	Lunch Buffet- *Kintamani - Level 3: If select "Muslim Meal" option The Square - Level 2: If select "non-Muslim Meal" option	Please present meal tickets at gate
	13:30 - 15:00	PM Concurrent Sessions	Venus I, II & III, Level 3 Jupiter I, II & III, Level 3
	15:00-15:30	Coffee/Tea Break with Snacks	Foyer - Level 3
	15:30 - 17:30	PM Concurrent Sessions	Venus I, II & III, Level 3 Jupiter I, II & III, Level 3
	18:00 - 21:30	Conference Banquet at Furama Riverfront (ticket holders only)	Mercury Ballroom, Level
Friday	08:00 - 17:00	Registration, Morning Coffee/Tea	Foyer - Level 3
	08:30-10:30	AM Concurrent Sessions	Venus I & II, Level 3
	10:30 - 11:00	Coffee/Tea Break with Snacks	Foyer - Level 3
	11:00 - 13:00	AM Concurrent Sessions	Venus I, II & III, Level 3 Jupiter I, II & III, Level 3
	13:00 - 14:30	Farewell Lunch Buffet	Foyer - Level 3

Wed - 7 Dec, 09:10-09:50 Venus I & II, Level 3

"2011 - A Service Odyssey"

OTE PRESENTATIO

Daniel Berg

Distinguished Research Professor of Engineering University of Miami USA



Abstract

The services sector, which includes such areas as health-care, education, recreation and utilities among others, accounts for more than 80 per cent of the economy of the United States of America, as measured by either the Gross Domestic Product (GDP) or employment metric. The other developed economies and developing economies seemingly are following the same pattern as the United States of America with increasing accent on the services sector.

Having grown up in a manufacturing-oriented family and with an earlier career similarly focused, I have experienced directly the transition to a service-oriented economy. Much of the transition but not all of it results from the technological revolution still in process in information technology.

As a student, researcher and teacher in service operations management and the management of technological innovation, I will share my Odyssey and explore the significance of the economic and social transition underway through the lens of a practioner in the critical field of technology management.

About the Speaker

Dr. Berg is a former Dean of Science and Provost at Carnegie Mellon University and Vice President for Academic Affairs and Provost at Rensselaer Polytechnic Institute (RPI), where he has also served as President. Prior to his academic career, he was Director of Research at Westinghouse and Technical Director. He has served and is serving on several boards of directors for a variety of industrial manufacturing and service companies and is chairman of the board for the Crystek Corporation, a manufacturer of RF timing products. In 2007, he received the Engineering Management Educator of the Year award from the IEEE Engineering Management Society. He is also a member of the US National Academy of Engineering and a Life Fellow of IEEE. Professor Berg received his PhD from Yale University.

Wed - 7 Dec, 09:50-10:30 Venus I & II, Level 3

"Reliability Management in New Product Development"

DNP Murthy

Professor School of Mechanical and Mining Engineering The University of Queensland, Australia



KEYNOTE PRESENTATION

Abstract

When customers (individuals, businesses or government agencies) buy a new product they have expectations that the product they have purchased will perform satisfactorily over its useful life. The performance depends on the reliability of the product. Building in reliability is costly but the consequence of not having adequate reliability is costlier. This implies that reliability management in new product development is very critical. The lecture will focus on this topic and proposes a methodology for effective decision-making, from a product life cycle perspective, taking into account the technical and commercial aspects

About the Speaker

Pra Murthy obtained B.E. and M.E. degrees from Jabalpur University and the Indian Institute of Science in India and M.S. and Ph.D. degrees from Harvard University. He is currently an emeritus professor in the School of Mechanical and Mining Engineering at the University of Queensland. Prior to this he was Director of the Technology Management Centre and Professor of Engineering Operations and Management. He has held visiting appointments at several universities in the USA, Europe and Asia (including a distinguished professorial appointment the National University of Singapore). His current research interests include various aspects of new product development (reliability in new product development) and post-sale support (warranties, service contracts). He has authored or co-authored 25 book chapters, 170 journal papers and 150 conference papers. He is a co-author of Mathematical Modelling (Pergamon Press, London, 1990), Warranty Cost Analysis (Marcel Dekker, New York, 1994), Reliability: Modelling, Prediction and Optimization (Wiley, New York, 2000), Weibull Models (Wiley, New York, 2003), Warranty Management and Product Manufacture (Springer Verlag, London, 2005), Maintenance: Decision Models for Management, (Science Press, Beijing), Product Reliability: Specification and Performance (Springer Verlag, 2008) and Warranty Data Collection and Analysis (Springer Verlag, 2011). He is co-editor of Product Warranty Handbook (Marcel Dekker, New York, 1996), Case Studies in Reliability and Maintenance (Wiley, New York, 2002) and Complex System Maintenance Handbook (Springer Verlag, 2007). He is on the editorial boards of eight international journals and has run short courses for industry on various topics in technology management, operations management and post-sale support in Australia, Asia, Europe and the USA.

Thu - 8 Dec, 09:00-09:40 Venus I & II, Level 3

"Employment and Productivity, a Paradox for Industrial Engineers"

Mitchell M. Tseng

Chair Professor Department of Industrial Engineering and Logistics Management Hong Kong University of Science and Technology Hong Kong

OTE PRESENTATIO

Abstract

In the past century, we, industrial engineers, along with global market force, and more educated work force, have made significant contributions in productivity improvement and altered the entire economic landscape. Particularly, in manufacturing industry, because high transferability of its outputs, the productivity improvement has substantially driven down the cost of production. While we are enjoying unprecedented abundance of products, productivity also translates to produce more with less. In the mean time, the rapid increase of labor participation from emerging economy, in the form of low labor cost, has substantially increased the size of productive labor pool, thus further compounding the issues of shortage of jobs. There are regions in the world suffering prolonged high unemployment. In fact, lack of employment opportunities for certain age groups in some geography has become a long-standing social problem that cultivates other social ills such as crime, unrest, and riots. This presentation attempts to stimulate discussion about the mission of industrial engineering from the perspective seemingly unresolvable conflicts of jobs and productivity. Hopefully, solutions can be developed to go beyond conventional remedies of unemployment insurance or redoubling isolated efforts in achieve competitive.

About the Speaker

Professor Mitchell M TSENG, Chair Professor of Industrial Engineering and Logistics Management and Associate Vice-President for Research and Innovation at Hong Kong University of Science and Technology. He currently also holds Nanyang Visiting Professorship at Nayang Technology University in Singapore.

Professor Tseng received both his Mater's and PhD degrees in Industrial Engineering from Purdue University. He is internationally known for his work in mass customization and global manufacturing. He started his career in developing key enabling manufacturing technologies for computer industry, some of which, including the diamond machining for polygons in laser printers, are still widely used. After serving in the industry for almost two decades, in 1993, he left his executive position from Digital Equipment Corporation and joined HKUST as the founding Head of the Department of Industrial Engineering.

Professor Tseng had held faculty positions in Massachusetts Institute of Technology, University of Illinois–Urbana Champaign, and MIT–Zaragoza International Logistics Program. He is an elected Fellow of the International Academy of Production Research (CIRP) and American Society of Mechanical Engineers (ASME). He has also been serving as a co-chair of the International Mass Customization and Personalization Conference since its inauguration in 2001.



Oral Presentation

1. Determine Your Audio-Visual Needs

Each meeting room comes equipped with a computer, LCD projector and screen. The computers in the meeting rooms and speaker ready room are being provided to Windows-based PC users. The PC will be configured with Windows operating system. Please bring your presentation files in Thumb drives only.

2. Prepare Your Presentation

Length of presentation material should be in accordance with your time allotted, each oral presentation is limited to 15 minutes (including Q&A). You are kindly requested to be at the presentation room at least 15 minutes before the session starts.

3. Create a Backup Copy of Your Presentation

We recommend that you bring at least 2 copies of your presentation to the meeting for backup purposes. Only Thumb drives are acceptable.

4. Give Your Presentation

Be considerate to the other speakers and audience by staying within your allocated time. The allocated time for your presentation includes a discussion and a changeover to the next speaker. Session Chairs will hold you to the allotted time. This is essential to ensure adequate time for questions and discussion as well as adherence to the schedule.

Please discuss the same material as reported in your abstract submission.

At the end of the meeting, all presentation files will be destroyed.

Poster Presentation

Poster sessions will be located at Venus III level 3 and your assigned poster board will be marked with your Paper ID. Please feel free to approach the help desk for assistance.

1. Prepare Your Poster

Each presenter is provided with a 2 metre high by 1 metre wide poster board.

The presentation must cover the same material as the paper submitted.

- Place your Paper ID, Paper Title and Authors' names prominently at the top of the poster to allow viewers to identify your abstract easily.
- Highlight the Authors' names, e-mail and address information in case the viewer is interested in contacting you for more information.
- You have complete freedom in displaying your information in figures, tables, text, photographs, etc in the poster.Include the background of your research followed by results and conclusions.
- A successful poster presentation depends on how well you convey information to an interested audience.
- Poster presentation depends on how well you convey information to an interested audience.

2. Set Up Your Poster

- Your poster presentation time is as shown in the session schedule and the poster must be set up at least 10 to 30 minutes before your presentation.
- Interactive forum is as scheduled and presenters are required to be at their posters during poster viewing times.
- Adhesive tapes and scissors are available at the Poster Help Desk, nearby the poster boards. If you have special needs for your poster presentation, please bring those supplies with you to the meeting.

3. Remove Your Poster

• Posters must be removed immediately after the end of the presentation schedule session. IEEM2011 will not be responsible for posters and materials left on poster boards after the end of the session.

PROGRAM OVERVIEW

			Tue - 6 Dec			
12:00	Registration Desk Opens					
14:00 - 17:00	Pre-conference Tour - Singapore Port Terminals					
15:00 - 16:30	Workshop: "Technology Innovation Management: an Editor's Perspective" (Mercury III, Level 5)					
16:30 - 18:30	Welcome Reception (Mercury I & II, Level 5)					
			Wed - 7 Dec			
9:00 - 10:30		Opening Remarks & Keynote Presentations (Venus I & II, Level 3)				
Meeting Rooms	Venus I	Venus II	Jupiter I	Jupiter II	Jupiter III	Venus III
11:00 - 12:30	Decision Analysis & Methods (1) p. 11	Operations Research (1) p. 12	Supply Chain Management (1) p. 13	Production Planning & Control (1) p. 14	Global Manufacturing and Management p. 15	
12:30 - 13:30	Lunch Buffet (The Square, Level 2 or Kintamani, Level 3)					
13:30 - 15:00	Decision Analysis & Methods (2) p. 11	Operations Research (2) p. 12	Supply Chain Management (2) p. 13	Production Planning & Control (2) p. 14	Engineering Education and Training p. 15	Poster Session 1 p. 16 & 17
15:30 - 17:30	Decision Analysis & Methods (3) p. 11	Operations Research (3) p. 12	Supply Chain Management (3) p. 13	Human Factors p. 14	Intelligent Systems p. 15	
			Thu - 8 Dec			
9:00 - 10:30	K	eynote Presentation f	followed by "Meet-th	ne-Editors" Session (V	/enus I & II, Level 3)	
Meeting Rooms	Venus I	Venus II	Jupiter I	Jupiter II	Jupiter III	Venus III
11:00 - 12:30	Decision Analysis & Methods (4) p. 18	Quality Control & Management (1) p. 19	Supply Chain Management (4) p. 20	Information Processing and Engineering	Facilities Planning and Management	
	1	1		p. 21	p. 22	
12:30 - 13:30	1	Lunch Buffet (The	Square, Level 2 or K	p. 21 Kintamani, Level 3)	p. 22	
12:30 - 13:30 13:30 - 15:00	Decision Analysis & Methods (5) p. 18	Lunch Buffet (The Project Management (1) p. 19	Square, Level 2 or K Supply Chain Management (5) p. 20	p. 21 Cintamani, Level 3) Technology and Knowledge Management (1) p. 21	Engineering Economy and Cost Analysis p. 22	Poster Session 2 p. 23 & 24
12:30 - 13:30 13:30 - 15:00 15:30 - 17:30	Decision Analysis & Methods (5) p. 18 Manufacturing Systems (1) p. 18	Lunch Buffet (The Project Management (1) p. 19 Project Management (2) p. 19	Square, Level 2 or K Supply Chain Management (5) p. 20 Safety, Security & Risk Management p. 20	p. 21 Gintamani, Level 3) Technology and Knowledge Management (1) p. 21 Technology and Knowledge Management (2) p. 21	Engineering Economy and Cost Analysis p. 22 Service Innovation and Management p. 22	Poster Session 2 p. 23 & 24
12:30 - 13:30 13:30 - 15:00 15:30 - 17:30 18:00 - 21:30	Decision Analysis & Methods (5) p. 18 Manufacturing Systems (1) p. 18	Lunch Buffet (The Project Management (1) p. 19 Project Management (2) p. 19 Conf	Square, Level 2 or K Supply Chain Management (5) p. 20 Safety, Security & Risk Management p. 20 erence Banquet (Men	p. 21 Cintamani, Level 3) Technology and Knowledge Management (1) p. 21 Technology and Knowledge Management (2) p. 21 rcury Ballroom, Leve	Engineering Economy and Cost Analysis p. 22 Service Innovation and Management p. 22 15)	Poster Session 2 p. 23 & 24
12:30 - 13:30 13:30 - 15:00 15:30 - 17:30 18:00 - 21:30	Decision Analysis & Methods (5) p. 18 Manufacturing Systems (1) p. 18	Lunch Buffet (The Project Management (1) p. 19 Project Management (2) p. 19 Conf	Square, Level 2 or K Supply Chain Management (5) p. 20 Safety, Security & Risk Management p. 20 erence Banquet (Mer Fri - 9 Dec	p. 21 Gintamani, Level 3) Technology and Knowledge Management (1) p. 21 Technology and Knowledge Management (2) p. 21 rcury Ballroom, Leve	Engineering Economy and Cost Analysis p. 22 Service Innovation and Management p. 22 15)	Poster Session 2 p. 23 & 24
12:30 - 13:30 13:30 - 15:00 15:30 - 17:30 18:00 - 21:30 Meeting Rooms	Decision Analysis & Methods (5) p. 18 Manufacturing Systems (1) p. 18 Venus I	Lunch Buffet (The Project Management (1) p. 19 Project Management (2) p. 19 Conf Venus II	Square, Level 2 or K Supply Chain Management (5) p. 20 Safety, Security & Risk Management p. 20 erence Banquet (Mer Fri - 9 Dec Jupiter I Reliability and	p. 21 Cintamani, Level 3) Technology and Knowledge Management (1) p. 21 Technology and Knowledge Management (2) p. 21 rcury Ballroom, Leve Jupiter II Technology and	Engineering Economy and Cost Analysis p. 22 Service Innovation and Management p. 22 15) Jupiter III	Poster Session 2 p. 23 & 24 Venus III
12:30 - 13:30 13:30 - 15:00 15:30 - 17:30 18:00 - 21:30 Meeting Rooms 8:30 - 10:30	Decision Analysis & Methods (5) p. 18 Manufacturing Systems (1) p. 18 Venus I E-Business and E- Commerce p. 25	Lunch Buffet (The Project Management (1) p. 19 Project Management (2) p. 19 Conf Venus II Quality Control & Management (2) p. 25	Square, Level 2 or K Supply Chain Management (5) p. 20 Safety, Security & Risk Management p. 20 erence Banquet (Mer Fri - 9 Dec Jupiter I Reliability and Maintenance Engineering (1) p. 26	p. 21 Cintamani, Level 3) Technology and Knowledge Management (1) p. 21 Technology and Knowledge Management (2) p. 21 rcury Ballroom, Leve Jupiter II Technology and Knowledge Management (3) p. 27	Engineering Economy and Cost Analysis p. 22 Service Innovation and Management p. 22 15) Jupiter III Systems Modeling and Simulation (1) p. 27	Poster Session 2 p. 23 & 24 Venus III Poster Session 3
12:30 - 13:30 13:30 - 15:00 15:30 - 17:30 18:00 - 21:30 Meeting Rooms 8:30 - 10:30 11:00 - 13:00	Decision Analysis & Methods (5) p. 18 Manufacturing Systems (1) p. 18 Venus I E-Business and E- Commerce p. 25 Manufacturing Systems (2) p. 25	Lunch Buffet (The Project Management (1) p. 19 Project Management (2) p. 19 Conf Venus II Quality Control & Management (2) p. 25 Quality Control & Management (3) p. 26	Square, Level 2 or K Supply Chain Management (5) p. 20 Safety, Security & Risk Management p. 20 erence Banquet (Mer Fri - 9 Dec Jupiter I Reliability and Maintenance Engineering (1) p. 26 Reliability and Maintenance Engineering (2) p. 26	p. 21 Gintamani, Level 3) Technology and Knowledge Management (1) p. 21 Technology and Knowledge Management (2) p. 21 rcury Ballroom, Leve Jupiter II Technology and Knowledge Management (3) p. 27 Technology and Knowledge Management (4) p. 27	Engineering Economy and Cost Analysis p. 22 Service Innovation and Management p. 22 15) Jupiter III Systems Modeling and Simulation (1) p. 27 Systems Modeling and Simulation (2) p. 28	Poster Session 2 p. 23 & 24 Venus III Poster Session 3 p. 29 & 30

Decision Analysis & Methods (1)

Wed, 7 Dec 11:00 - 12:30 Room: Venus I

Chairs: Krzysztof Ostaszewski Amir Elalouf

Abstracts: see page 31

Profitability Analysis Using Data Envelopment Analysis-Discriminant Analysis: an Empirical Study Hung-Tso Lin¹, Yin-Chi Huang¹ ¹National Chin-Yi University of Technology, Taiwan

Comparison of Neural Network and Regression Techniques for Nonlinear Prediction Problems Usha Anantha Kumar¹, Mukta Paliwal¹ ¹Indian Institute of Technology Bombay, India

A Decision Analysis on Flexible Scale of Green Logistics under Limited Carbon Emission with Real Options Concept

Concept Tyrone T. Lin¹, Mong-Tien Chan¹ ¹National Dong Hwa University, Taiwan

Integration Model of Fuzzy C Means Clustering Algorithm and TOPSIS Method for Customer Lifetime Value Assessment

Amir Hossein Azadnia¹, Muhamad Zameri Mat Saman¹, Kuan Yew Wong¹, Abdul Rahman Hemdi² ¹Universiti Teknologi Malaysia, Malaysia ²Universiti Teknologi Mara, Malaysia

A Modified Algorithm to Find a Representative Capacity with Evenness Consideration for Non-additive Robust Ordinal Regression

Roghayeh Hemmatjou¹, Nasim Nahavandi², Behzad Moshiri³, I. Nakhai¹ ¹Tarbiat Modares University, Iran ²University of Tarbiat Modarres, Iran

³Tehran University, Iran

Established the Evaluation Structure of the Investment Benefit of the "Doubling Tourist Arrivals Plan" in Taiwan

Huey-hsi Lo¹, Pei-cheng Wen² ¹Aletheia University, Taiwan ²Chung-Hua Institution for Economic Research, Taiwan

Decision Analysis & Methods (2)

Wed, 7 Dec 13:30 - 15:00 Room: Venus I

Chairs: Yuya Kajikawa Egon Mueller

Abstracts: see page 32

Analyzing Newsvendor Problems by One-Shot Decision Approaches with Considering Regret Peijun Guo¹, Yating Yang¹ ¹Yokohama National University, Japan

Simplification of Decision Making Matrix in Fuzzy Multiple Attribute Decision Making Zhi Pei¹, Li Zheng² ¹Zhejiang University of Technology, China ²Tsinghua University, China

A Petri Net Approach to

Resource Allocation in Brand Management Systems Hongwei Liao¹, Min Lu² ¹University of Michigan, Ann Arbor, United States ²The Hong Kong Polytechnic University, China

Optimal Determination of Simulated Annealing Parameters using TOPSIS Fateme Fotuhi

¹University of South Carolina, United States

Merger and Acquisition Decisions Analysis with Sustainability Operation Concept

Tyrone T. Lin¹, Yi-Shun Huang¹ ¹National Dong Hwa University, Taiwan

Simulation-Based Operational Decision Analysis at Decoupling Point in MTS-MTO System Feng Yu Wang¹, Laura Xiao Xia Xu¹,

Feng Yu Wang¹, Laura Xiao Xia Xu¹, Ronald Lim¹, E.W. Lee¹, Michal Zarzycki¹ ¹Singapore Institute of Manufacturing Technology, Singapore

Decision Analysis & Methods (3)

Wed, 7 Dec 15:30 - 17:30 Room: Venus I

Chairs: Yves De Smet Ching-Yu Lien

Abstracts: see page 33

Applying Green Goodwill for Project Management on Green Economics Concept Tyrone T. Lin¹, Wei-Cheng Wu¹ ¹National Dong Hwa University, Taiwan

A Fuzzy-based Integrated Framework for Monitoring Stochastic Demand in a Supply Chain Environment Henry Lau¹, Premaratne Samaranayake¹, Dilupa Nakandala¹ 'University of Western Sydney, Australia

A Multicriteria Decision Model for Managing Business Processes

Ana Carolina Campos¹, Adiel Almeida¹ ¹Federal University of Pernambuco, Brazil

Reducing Violence: A Proposal Based on Multicriteria SMARTS Method

Andre Gurgel¹, Caroline Mota¹, Dario Aloise² ¹Federal University of Pernambuco, Brazil

²Federal University of Rio Grande do Norte, Brazil

Selection and Ranking of Improvement Approaches in Construction Companies: SMARTS Method

Renata Maciel de Melo¹, Denise Medeiros¹, Adiel Almeida¹ ¹Federal University of Pernambuco, Brazil

Innovative Support of Creation by Analogy-based Searching of Potential Needs

Takayuki Suzuki¹, Taro Tezuka², Atsushi Aoyama¹, Fuminori Kimura¹, Akira Maeda¹

¹Ritsumeikan University, Japan ²University of Tsukuba, Japan

Insurance Pricing, Reinsurance and Investment Decision Based on the Mutual Benefit of the Insurer and the Customer

Hong Mao¹, Krzysztof M. Ostaszewski² ¹Shanghai Second Polytechnic University, China

²Illinois State University, United States

Enhancing Tool Availability in the Forging Industry by Adjusting PPC and Tool Maintenance

Anis Selaouti¹, Sven Baumgarten¹, Jens-Michael Potthast¹, Rouven Nickel¹ ¹Institute of Integrated Production Hannover gGmbH, Germany

Operations Research (1)

Wed, 7 Dec 11:00 - 12:30 Room: Venus II

Chairs: Mohamed K Omar Arik Sadeh

Abstracts: see page 34

Robust Optimization for Resource-constrained Project Scheduling with Uncertain Activity Durations

Roel Leus¹, Christian Artigues², Fabrice Talla Nobibon³ ¹Katholieke Universiteit Leuven, Belgium ²Research Institution, France ³HEC-Management School, University of Liege, Belgium

EPSO for Solving Non-oriented Two-dimensional Bin Packing Problem

Mohamed K. Omar¹, Kumaran Ramakrishnan² ¹Nottingham University Malaysia, Malaysia ²Multimedia University, Malaysia

Equivalent Relationships of Problem Formulations Optimizing Forecast Accuracy

Xue-Ming Yuan¹, Wee Meng Yeo¹, Joyce M.W. Low² ¹Singapore Institute of Manufacturing Technology, Singapore ²Korea Aerospace University, South Korea

Multi-heuristics Based Genetic Algorithm for Solving Maritime Inventory Routing Problem

Nurhadi Siswanto¹, Daryl Essam¹, Ruhul Sarker¹ ¹University of New South Wales, Australia

A Heuristic Algorithm for Substrates Testing in MCM Keisuke Murakami¹

¹National Institute of Informatics, Japan

Nash Equilibruim Retail Prices in a Linear Duopoly Market Tomoki Hamaguchi¹, Koichi Nakade¹ ¹Nagoya Institute of Technology, Japan

Cross Docking Scheduling with Delivery Time Window and Temporary Storage Dwi Agustina¹, Carman Ka Man Lee¹,

Rajesh Piplani¹ ¹Nanyang Technological University, Singapore

Operations Research (2)

Wed, 7 Dec 13:30 - 15:00 Room: Venus II

Chairs: Romeo Marian Noor Hasnah Moin

Abstracts: see page 35

A Stochastic Formulation of Successive Software Releases with Faults Severity Ompal Singh¹, Pramod Kumar Kapur¹, Adarsh Anand¹ ¹University of Delhi, India

Capacitated Hub Location Problems with Waiting Time at Hubs

Arsham Atashi¹, Mostafa Abedzadeh¹ ¹K. N. Toosi University of Technology, Iran

Evaluation on Operation Management of Cascade Hydropower Stations

Y. Zheng¹, X.D. Fu², Jia Hua Wei², Xiang Li²

¹Tsinghua University, Three Gorges University, China ²Tsinghua University, China

A Review of Data Envelopment Analysis Models for Handling Data Variations

Chuen Tse Kuah¹, Kuan Yew Wong¹ ¹Universiti Teknologi Malaysia, Malaysia

Order Batching and Picking in a Synchronized Zone Order Picking System

Li Pan¹, Joshua Zhexue Huang², Sydney C. K. Chu¹ ¹The University of Hong Kong, China ²Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, China

Evacuation Route Scheduling Using Discrete Time-Based Capacity-Constrained Model Mojahid F. Saeed Osman¹, Bala Ram² ¹King Fahd University of Petroleum and Minerals, Saudi Arabia ²North Carolina A&T State University, United States

Operations Research (3)

Wed, 7 Dec 15:30 - 17:30 Room: Venus II

Chairs: Xue-Ming Yuan Mojahid Saeed Osman

Abstracts: see page 36

A Hospital Admission Planning Model for Emergency and Elective Patients Under Stochastic Resource Requirements and No-shows Phongchai Jittamai¹, Thirapan Kangwansura¹ ¹Suranaree University of Technology, Thailand

Multi-processor Job Shop Scheduling with Due Windows Rong-Hwa Huang¹, Shun-Chi Yu¹ ¹Fu Jen Catholic University, Taiwan

Fu Jen Catholic University, Taiwan

Spreadsheet Approach for Solving Complex Flowshop Scheduling Problems Mohamed K. Omar¹ ¹Nottingham University Malaysia, Malaysia

A Pseudo-efficient Frontier Method for Solving Two-Phase Packing Problems David Raz¹, Arik Sadeh¹ ¹Holon Institute of Technology, Israel

Moral Hazard Resolved in Communication for S4n-Logic -Acyclic Communication Network Case -Takashi Matsuhisa¹ 'Ibaraki National College of Technology, Japan

Optimization of Multi Periods Inventory Routing Problem Model with Time Varying Demand Noor Hasnah Moin¹ 'University of Malaya, Malaysia

A Math-heuristic Approach for Integrated Resource Scheduling in a Maritime Logistics Facility Hua Xing Chen¹, Hoong Chuin Lau¹ ¹Singapore Management University, Singapore

A Tabu Search Algorithm for Integrated Inventory and Vehicle Routing Problem in One Depot and Multicustomers Distribution System Anchalee Supithak¹ ¹Thai-Nichi Institute of Technology,

Thailand

Supply Chain Management (1)

Wed, 7 Dec 11:00 - 12:30 Room: Jupiter I

Chairs: Niak Wu Koh Md. Mamun Habib

Abstracts: see page 37

Effective Design of the Construction Supply Chain: A Case of Small Buildings in Thailand

Sataporn Amornsawadwatana¹ ¹University of the Thai Chamber of Commerce, Thailand

Simply Structured Policies for a Dynamic Pricing Problem with Constant Price Elasticity Demand

Chia-Shin Chung¹, James Flynn¹ ¹Cleveland State University, United States

Governance Mode in Reverse Logistics: a Research

Framework Qing Lu¹, Mark Goh¹, Robert De Souza¹ ¹National University of Singapore, Singapore

Developing an Improved Particle Swarm Optimization Algorithm for Solving the Inventory Routing Problem with Direct Shipment I. Nakhai', Seyed Hessameddin Zegordi', Ali Hossein Mirzaei' 'Tarbiat Modares University, Iran

Risks Assessment of Lower Tier Suppliers Using Operational Reliabilities and Product Availabilities Gopal Agarwal¹, Piyush Singhal², Murari LaiMittal¹ ¹Malaviya National Institute of Technology Jaipur, India ²GLA University, India

EOQ Model Development for Perishable Items under Stock Dependent Demand and Time Dependent Partial Backlogging by Using Intelligent Packaging Narges Khanlarzade¹, I. Nakhai¹, B. Yousefi² "Iarbiat Modares University, Iran ²Islamic Azad University, Iran

A Study on Lean Supply Chain Performance Measures of SMEs in the Automotive Industry Farzad Behrouzi¹, Kuan Yew Wong¹, Farshad Behrouzi¹ 'Universiti Teknologi Malaysia, Malaysia

Supply Chain Management (2)

Wed, 7 Dec 13:30 - 15:00 Room: Jupiter I

Chairs:	Weidong Lin
	Virgilio Cruz-Machado

Abstracts: see page 38

An Exploratory Research on Educational Supply Chain Management

Md. Mamun Habib¹, Veena Tewari², VVR Raman³ ¹American International University-Bangladesh (AIUB), Bangladesh ²Asia Pacific Institute of Management, India ³Asmara College of Health Sciences, South Africa

Production and Distribution Planning Model for Hinterland Supply Chain

Shi Tao Zhao¹, Xue-Ming Yuan², Shih Fu Ling¹ ¹Nanyang Technological University, Singapore ²Singapore Institute of Manufacturing Technology, Singapore

The Application of Vendor Managed Inventory in the Supply Chain Inventory Model with Probabilistic Demand Voi Ametina Hidavat Ika Deafi

Yosi Agustina Hidayat¹, Ika Deefi Anna², Arlene Khrisnadewi¹ ¹Bandung Institute of Technology, Indonesia ²Bandung Institute of Technology, University of Trunojoyo, Indonesia

A Logistics Execution Method for the Regional Distribution Center

Yuan-Kuei Huang¹, Wei-Jun Lu², Jun-Der Leu² ¹Deloitte & Touche Consulting Co., Taiwan ²National Central University, Taiwan

Research on Measuring Method of Supply Chain Resilience Based on Biological Cell Elasticity Theory Ying Shuai¹, Xinping Wang¹, Lindu Zhao¹ 'Southeast University, China

Critical Success Factors of Total Productive Maintenance Implementation: A Review

Kam-Choi Ng¹, Gerald Guan Gan Goh²,
 Uchenna Cyril Eze³
 ¹Infineon Technologies, Malaysia
 ²Multimedia University, Malaysia
 ³Monash University Sunway, Malaysia

Supply Chain Management (3)

Wed, 7 Dec 15:30 - 17:30 Room: Jupiter I

Chairs: Songlin Chen Maria Grazia Gnoni

Abstracts: see page 39

Designing the Optimal Strategies for Supply Chain Financing under Warehouse Receipt Pledging with Credit Line Nina Yan¹, Tian Tian¹ ¹Central University of Finance and Economics, China

A Framework for Integrated Assessment of Sustainable Supply Chain Management Farzad Dehghanian¹, Saeed Mansoor², Mahboobeh Nazari² ¹Ferdowsi University of Mashhad, Iran ²Amirkabir University of Technology, Iran

A Multiobjective Evolutionary Approach for Integration of Location-Inventory and Vendor Selection Decisions Chia-Lin Hsieh¹ ¹Aletheia University, Taiwan

Selection of Distribution Centers with the Time Value of Money and the Loyal Customer Effect

Alireza Amini¹, Reza Tavakkoli-Moghaddam¹, Armand Baboli² ¹University of Tehran, Iran ²Universite de Lyon, France

Coffee Waste Management. A Case Study

Virginia Machado¹, Ana Paula Barroso¹, Carolina Santos¹, Virgilio Cruz Machado¹ ¹Universidade Nova de Lisboa, Portugal

A Buffer Stock Model to Ensure Price Stabilization and Availability of Seasonal Staple Food by Empowering Producer Using Warehouse Receipt System

Wahyudi Sutopo¹, Senator Nur Bahagia², Andi Cakravastia², T.M.A. Arisamadhi² ¹Bandung Institute of Technology, Sebelas Maret University, Indonesia ²Bandung Institute of Technology, Indonesia

Conceptual Model for Information Systems of Sustainable Supply Chain Management

Majid Aarabi¹, Muhamad Zameri Mat Saman¹, Mohammad Reza Khoei¹, Kuan Yew Wong¹, Hooshang M. Beheshti², Norhayati Zakuan¹ 'Universiti Teknologi Malaysia, Malaysia ²Radford University, United States

Using an Artificial Neural Network and a Mathematical Model for Sugarcane Harvesting Scheduling Surached Thuankaewsing¹, Supachai Pathumnakul¹, Kullapapruk Piewthongngam¹ ¹Khon Kaen University, Thailand

Production Planning & Control (1)

Wed, 7 Dec 11:00 - 12:30 Room: Jupiter II

Chairs: Suksan Prombanpong Fazleena Badurdeen

Abstracts: see page 40

Optimum Quantities of Make and Buy in Multi-Item Manufacturing Firms with Restriction in Production Capacity Mohammadal A. Pirayesh Neghab¹, Saeed Poormoaied¹ ¹Ferdowsi University of Mashhad, Iran

Study and Application of Scheduling Method for Just-in-time Production in Flexible Job Shops Wei Weng¹, Shigeru Fujimura¹ ¹Waseda Üniversity, Japan

Order Selection of Processed Chicken under Production Capacity Constraints Pachara Chatavithee¹, Kullapapruk Piewthongngam¹, Supachai Pathumnakul¹ ¹Khon Kaen University, Thailand

Clustering Variables Selection in Mass Customized Scenarios Affected by Workers' Learning Michel Anzanello¹, Flavio Fogliatto¹ ¹Federal University of Rio Grande do Sul, Prazil Brazil

Interactive Online Process Management and Quality Control for Cross-Sited **Production Process Chains** Peter Becker¹, Robert Schmitt² ¹Fraunhofer Institute for Production Technology, Germany ²*RWTH Aachen University, Fraunhofer Institute for Production Technology,* Germanu

Periodic Virtual Cell Manufacturing (P-VCM) -Concept, Design, and Operation Jannes Slomp¹, Dimitry Krushinsky¹,

Rahul Caprihan² ¹University of Groningen, Netherlands ²Dayalbagh Educational Institute, India

A Novel Virtual Design **Platform for Product Innovation Through Customer** Involvement Xingyu Chen¹, Chun-Hsien Chen¹, Kah Fai Leong¹ ¹Nanyang Technological University, Singapore

Production Planning & Control (2)

Wed, 7 Dec 13:30 - 15:00 Room: Jupiter II

Chairs: Jannes Slomp Seyyed Mohammad Taghi Fatemi Ghomi

Abstracts: see page 41

Adaptive Scheduling by Means of Product-specific Emergence Data Gunther Reinhart¹, Florian Geiger¹

¹Technische Universitat Munchen, Germanu

A Worker Assignment for Machine Cluster in the Manufacturing Cell Suksan Prombanpong¹, Waraporn Seenpipat¹ ¹King Mongkut's University of Technology Thonburi, Thailand

Optimal Production Policy of Production System with Inventory-level-dependent Demand in Segmented Market Yogender Singh¹, Kuldeep Chaudhary¹, P.C. Jha¹ ¹University of Delhi, India

Heuristic Decomposition and LP-based Scheduling in Make-and-Pack Production Philipp Baumann¹, Norbert Trautmann¹ ¹University of Bern, Switzerland

Robust Optimization Model for Fan Coil Production Planning under Supply Uncertainty Jamshid Nazemi¹, Roja Zakeri¹ ¹Islamic Azad University, Iran

An Application of Network Topology to Understand The Signal in Process Variability: A Case Study in Petrochemical Industry

Shamshuritawati Sharif¹, Maman Diauhari² ¹Universiti Teknologi Malaysia, Universiti Utara Malaysia, Malaysia ²Universiti Teknologi Malaysia, Malaysia

Human Factors

Wed, 7 Dec 15:30 - 17:30 Room: Jupiter II

Chairs: Jan Pieter Clarys Mohammed-Aminu Sanda

Abstracts: see page 42

Monitoring and Classifying Evidence-Based Workload for Profiling Manual Handling Occupations Jan Pieter Clarys¹, Jonathan Tresignie¹, Aldo Scafoglieri¹, Erik Cattrysse¹ ¹Vrije Universiteit Brussel, Belgium

Measurement of Handgrip Force of the Dominant Hand at Pre-selected Force Levels for Males Kai-Wav Li1 ¹Chung Hua University, Taiwan

Lumbosacral Bending Moment Assessment and Parameter **Optimization Using Taguchi** Design during Lifting Task in a Steel Rolling Mill ¹Government College of Engineering and Technology, India ²National Institute of Technology, India

A Perspective on Human Factors Contributing to Quality **Requirements: a Cross-case** Analysis

Annlize Marnewick¹, H.C. Pretorius¹, Leon Pretorius² ¹University of Johannesburg, South Africa ²University of Pretoria, South Africa

Occupational Stress, Knowledge Sharing and GSD Communication Barriers as Predictors of Software Engineer's Creativity Aamir Amin¹, Shuib Bin Basri¹, Mohd Fadzil Hassan¹, Mubashir Rehman¹ ¹Universiti Teknologi Petronas, Malaysia

Miners' Tacit Knowledge: A Unique Resource for **Developing Human-oriented** Lean Mining Culture in Deep Mines

Mohammed Aminu Sanda¹, Jan Johansson¹, Bo Johansson² ¹Lulea University of Technology, Sweden

Identifying the Meaning of Information Signs in Traffic Facilities Hsien-Yu Tseng¹, Bor-Shong Liu¹

1St. John's University, Taiwan

Analysis of Design and Purchase Decision of Central **Dust Collection System** Yeasin Bhuiyan¹, A.l. Khan² ¹Bangladesh University of Engineering and Technology, Bangladesh ²University of Kentucky, United States

Global Manufacturing and Management

Wed, 7 Dec 11:00 - 12:30 Room: Jupiter III

Alan Pilkington Chairs: Shin-Guang Chen

Abstracts: see page 43

Role of Knowledge Management in World Class Manufacturing: an Empirical Investigation Abhijeet Digalwar¹, Kuldip Singh Sangwan¹ ¹Birla Institute of Technology and Science, India

Statistical Quality Control **Measurement on Furniture** Manufacturer Laurence¹, Christine Puteri Utama¹, Jessica Hanafi¹ ¹University of Pelita Harapan, Indonesia

The Influence of Geothermal Environment to the Quality of Porcelain Insulator: A **Correlation Analysis** Syahidah Yusoff¹, Maman Djauhari¹ ¹Universiti Teknologi Malaysia, Malaysia

Learning Organisation in New Zealand and Malaysian Manufacturing Companies Affandi Mohd-Zainal¹, Jane Goodyer¹, Nigel Grigg¹, Jafri Mohd Rohani² ¹Massey University, New Zealand ²Universiti Teknologi Malaysia, Malaysia

Integration of Production and Supply Chain Strategic Planning for Renewable **Resources under Sustainability Considerations: Teakwood Case** Study

Bobby Kurniawan¹, Muhammad Hisjam², Wahyudi Sutopo³ ¹Bandung Institute of Technology, University of Sultan Ageng Tirtayasa, Indonesia ²Sebelas Maret University, Indonesia ³Bandung Institute of Technology, Sebelas Maret University, Indonesia

On Work Performance for the Labor-intensive Manufacturing Shin-Guang Chen¹ ¹Tungnan University, Taiwan

Engineering Education and Training

Wed, 7 Dec 13:30 - 15:00 Room: Jupiter III

Seng Fat Wong Chairs: **Richard Fung**

Abstracts: see page 44

In House Industrial Training for Mechanical Engineering Students: a Multidisciplinary Approach S.K. Li¹, KK Lau¹, Vincent Li¹ ¹Hong Kong University of Science and Technology, China

RFID-Aided Manufacturing Training System and Localization Seng Fat Wong¹, W. I. Ho¹, Zhixin Yang¹, C. T. Kwok¹ ¹University of Macau, Macau

Students' Experiences in Different Forms of Support during Doctoral Studies Katja Lahenius¹, Salla Maatta² ¹Aalto University, Finland ²University of Jyvaskyla, Finland

Educational Game Concept for the Transfer of Results from the Transdisciplinary Research to the New Scientific Generation Florian G. H. Behncke¹, Moritz King¹, Udo Lindemann¹ ¹Technische Universitat Munchen, Germany

Quantitative Analysis of International Mobility of **Robotics Researchers** and **Characteristics of Domestic Robotics Research** Takao Furukawa¹, Nobuyuki Shirakawa¹, Kumi Okuwada¹, Kazuya Sasaki² ¹National Institute of Science and Technology Policy, Japan ²Utsunomiya University, Japan

Green Design Principles and Trends of Using Them among Bangladeshi Consumer Goods Manufacturers Md. Shahriar Jahan Hossain¹, Nafis Ahmad¹ ¹Bangladesh University of Engineering and Technology, Bangladesh

Intelligent Systems

Wed, 7 Dec 15:30 - 17:30 Room: Jupiter III

Nan Chen Chairs: R. J. Kuo

Abstracts: see page 45

Evolutionary-Based Support Vector Machine R. J. Kuo¹, C. M. Chen² ¹National Taiwan University of Science and Technology, Taiwan ²National Taipei University of Technology, Taiwan

The Effectiveness of Hybrid **Negative Correlation Learning** in Evolutionary Algorithm for Combinatorial Optimization Problems

Ronnachai Sirovetnukul¹, Parames Chutima², Warin Wattanapornprom², Prabhas Chongstitvatana² ¹Mahidol University, Thailand ²Chulalongkorn University, Thailand

A New Guillotine Placement Heuristic Combined with an Improved Genetic Algorithm for the Orthogonal Cutting-Stock Problem Slimane Abou Msabah1, Ahmed Riadh Baba-Ali1 ¹University of Science and Technology Houari Boumedienne, Algeria

Intelligent System for Wind **Generating Plant** Yoko Amano ¹Nihon University, Japan

Collaborative and Non-Collaborative Dynamic Path Prediction Algorithm for **Mobile Agents Collision** Detection with Dynamic **Obstacles in a Two-dimensional** Space Elmir Babovic¹

¹FIT Mostar, Bosnia and Herzegowina

Component-Integrated Sensors and Communication for **Gentelligent Devices** Ludger Overmeyer¹, Lutz Rissing¹, Marc C. Wurz¹, Michael Dumke¹, Stefan

Franke¹, Tim Griesbach¹, Alexander Belski¹ ¹Leibniz University Hannover, Germany

Data Mining Application for Customer Segmentation Based on Loyalty: An Iranian Food Industry Case Study Ali Hajiha¹, Reza Radfar¹, Samira Sarafi Malayeri² ¹Islamic Azad University, Iran ²Islamic Azad University, United Arab Emirates

Technology and Knowledge Sharing Strategy in Systems **Engineering Practice performed** by Indonesian Expatriate Engineers

Ika Windiarti¹, Timothy Ferris¹, Matthew Berryman² ¹University of Šouth Australia, Australia ²University of Wollongong, Australia

15

Poster Session 1

Wed, 7 Dec Room: Venus III

- p.46 An Integrated Multi Agent Based Model to Find the Most Agile Supplier Hoda Ghahremanloo¹, Mohamad Jafar Tarokh¹ ¹K. N. Toosi University of Technology, Iran
- p.46 Measuring Supply Chain of Packed Milk from Consumer Perspective in Pakistan Fariza Kamran¹, Osman Babar¹, Muhammad Asim² ¹National University of Sciences & Technology, Pakistan ²Center for Advance Studies in Engineering, Pakistan
- p.46 Impact of Product Design Decisions within Product Development on the Supplier Selection Process at the Automotive Industry Florian G. H. Behncke¹, Katrin Abele², Udo Lindemann¹ ¹Technische Universitat Munchen, Germany ²Dr.-Ing. h.c. F. Porsche AG, Germany
- p.46 A Measurement Model for Collaboration between Suppliers and Manufacturers Pingyuan Zou¹, Hao Zhang¹ ¹Beijing Technology and Business University, China
- p.46 An optimization model for global supplier selection Ramzi Hammami¹ ¹Toulouse Business School, France
- p.46 Service Supply Chain Practices from the Perspective of Malaysian Tourism Industry T.K. Hong¹, Suhaiza Zailani¹ ¹Universiti Sains Malaysia, Malaysia
- p.46 Optimal Selection of Location for Distributed Generations to Ensure a Competitive Advantage Using Fuzzy Analytical Network Process Mahdiyeh Montazeri¹, Mohamad Saleh Owlia², A Moghimi³, Mohamad Kamalzadeh⁴ ¹Mazandaran University of Science and Technology, Iran ²Yazd University, Iran ³Taft PNU university, Iran ⁴Industrial Engineering, Iran
- p.46 A Self-Crossover Genetic Algorithm for Job Shop Scheduling Problem Shiwang Hou¹, Yongjiang Liu¹, Haijun Wen¹, Yuepeng Chen¹ 'North University of China, China
- p.46 A Solution to the Capacitated Lot Sizing Problem Zhicong Zhang', Weiping Wang¹, Shouyan Zhong¹, Kaishun Hu¹ ¹Dongguan University of Technology, China

- p.47 Non-cooperative Game Decision for Capacity Evaluation under Output Demand Uncertainty Ting Yang¹, Dinghua Zhang¹, Bing Chen¹, Shan Li¹ ¹Northwestern Polytechnical University, China
- p.47 Losses Caused by the Presetting of Tools by the Manual Method Milton Vieira Junior¹, Jose Martinele A. Silva¹, Ivan Correr², Nivaldo L. Coppini¹, Elesandro A. Baptista¹ ¹University Nove de Julho, Brazil ²GeoTecno Solucoes em Automacao, Brazil
- p.47 Feature Fatigue Analysis Based on Behavioral Decision Making Mingxing Wu¹, Liya Wang¹ ¹Shanghai Jiao Tong University, China
- p.47 Value Stream Mapping Simulation Using ProModel Software Nivaldo L. Coppini¹, Luiz C. Bekesas¹, Elesandro A. Baptista¹, Milton Vieira Junior¹, Wagner C. Lucato¹ ¹University Nove de Julho, Brazil
- p.47 Simulation for Implementing RFID-EPC in Reverse Supply Chain Based on Consumer Market Qiaolun Gu¹, Tiegang Gao² ¹Tianjin University of Technology and Education, China ²Nankai University, China
- p.47 The Use of Artificial Neural Network (ANN) for Modeling of Diesel Contaminated Soil Remediation by Composting Process Mehrdad Khamforoush¹, M-Javad Rahi¹, Tahmas Hatami¹, Kourosh Rahimzade² ¹University of Kurdistan, Iran ²National Iranian Oil Products Distribution Company, Iran
- p.47 Integrated Development of Space Systems - Design for AIT - Design for Assembly, Integration and Testing of Satellites - D4AIT Adalberto Coelho Silva¹, Geilson Loureiro¹ ¹National Institute for Space Research, Brazil
- p.47 Using Structural Complexity Management for Design Process Driven Modularization Harrys Daniilidis¹, David Hellenbrand¹, Wolfgang Bauer¹, Udo Lindemann¹ 'Technische Universitat Munchen, Germany
- p.48 Study on Dynamical Properties and Simulation of a Four-Dimensional Nonlinear Discrete Dynamics Jing Peng¹, Zehua Miao², Luoping Zheng³ ¹Shijiazhuang University of Economics, Tianjin University, China ²Shijiazhuang University of Economics, Beijing Institute of Technology, China ³Shijiazhuang University of Economics, China

- p.48 Organizational E-Readiness Impact on E-Procurement Implementation Naseebullah Langove¹, Shuib Bin Basri¹, P. D. D. Dominic¹, Muhammad Jehangir¹ ¹Universiti Teknologi Petronas, Malaysia
- p.48 **Technological Economic Study for Ocean Energy Development in China** Tianqi Wang¹, Peng Yuan² ¹Zhejiang University, China ²Ocean University of China, China
- p.48 Profit Generation in a Machining Service Provider -Optimization Combining Theory of Constraints and Contribution Margin Concept Elesandro A. Baptista¹, Wagner C. Lucato¹, Nivaldo L. Coppini¹, Milton Vieira Junior¹, Luiz C. Bekesas¹ ¹University Nove de Julho, Brazil
- p.48 Understanding Project Success: The Four-Level Project Success Framework Eskander Howsawi¹, David Eager¹, Ravindra Bagia¹ ¹University of Technology Sydney, Australia
- p.48 **Probabilistic Sustainable Design Using Multiobjective Optimization Model** Jui-Sheng Chou¹, Thanh-Son Le¹ ¹National Taiwan University of Science and Technology, Taiwan
- p.48 **The Role of Time, Cost and Quality in Project Management** Nurul Izah Anuar¹, Poh Kiat Ng¹ ¹Multimedia University, Malaysia
- p.48 A Study of Measuring the Impact of Employee Perception on Business-IT Alignment via Neural Network T. C. Wong¹, Shing-Chung Ngan¹, Felix T. S. Chan², Alain Y. L. Chong² ¹City University of Hong Kong, China ²Polytechnic University of Hong Kong, China
- p.49 New Insight into Technology Licensing Strategy and Innovation Performance: Evidence from Chinese Latecomers in High-tech Industries Yang Yang Zhao¹, P.K. Wong¹, A. M. Subramanian¹, C. C. Hang¹ ¹National University of Singapore, Singapore
- p.49 **Functional Semantic Retrieval** for Effects Knowledge Base Hongtao Wu¹, Jinling Zhang¹, Jianhong Ma¹, Runhua Tan¹ ¹Hebei University of Technology, China

p.49 Constructing a Dynamic Evaluation Model for Corporate Diversification – The Thin-film Solar Cell Chang-Lin Yang¹, Rong-Hwa Huang¹ ¹Fu Jen Catholic University, Taiwan

- p.49 A Study of Inter-firm Network and Knowledge Integration Impact Mechanism on Absorptive Capacity Zhigang FAN¹, Shuai GENG², Xiaoying PENG¹ ¹Hangzhou Normal University, China ²Zhejiang University City College, China
- p.49 Adoption of Hierarchical Structure for Web Document Analysis in Knowledge Management System Rozlini Mohamed', Junzo Watada² 'University Tun Hussein Onn Malaysia, Malaysia 'Waseda University, Japan
- p.49 Activities and Problems in New Product Development Process in the Networking Industry - A Case of Different Business Models Min-Sun Wuang', Shu-Min Chiang¹ ¹Fu Jen Catholic University, Taiwan
- p.49 A Case Study on the Importance of Knowledge Management in Creative Product Development Poh Kiat Ng¹, Nurul Izah Anuar¹ 'Multimedia University, Malaysia
- p.49 **Improving a Model for New** Service Development Alireza Sheikhzadeh¹, Hamed Heidari¹ ¹Amirkabir University of Technology, Iran
- p.50 HSR Buying Behavior Modeling-Taiwan High Speed Railway Case Hsiao-min Chuang¹, Chihpeng Chu², Yu-tzeng Lin³ ¹St. Mary's Medicine, Nursing and Management College, Taiwan ³National Dong Hva University, Taiwan ³Taiwan Tourism & Hospitality Management College, Taiwan
- p.50 An Approach of Quality Management in the Small Business Environment of South Africa Bingwen Yan¹, Li Zhang¹ ¹Cape Peninsula University of Technology, South Africa

Decision Analysis & Methods (4)

Thu, 8 Dec 11:00 - 12:30 Room: Venus I

Chairs: Usha Ananthakumar Feng-Chia Li

Abstracts: see page 51

Genetic Algorithm for the Project Scheduling Problem with Fuzzy Time Parameters Yilun Huang¹, Yongyi Shou¹, Linda Zhang² ¹Zhejiang University, China ²IESEG School of Management, France

Detection and Improvement of Deficiencies and Failures in **Public-** Transportation Networks using Agent-Enhanced Distribution

Tata Mining Eugene Levner¹, Avishai Ceder², Amir Elalouf³, Yuval Hadas³, Dvir Shabtay⁴ Ashkelon Academic College, Israel ²Technion-Israel Institute of Technology, Israel ³Bar Ilan University, Israel ⁴Ben-Gurion University of the Negev, Israel

Forecasting the Exchange Rate between ASEAN Currencies and USD

Tien-Chin Wang¹, Su-Hui Kuo¹, Hui-Chen Chen ¹National Kaohsiung University of Applied Sciences, Taiwan ²Kansai University, Japan

Pricing Annuity Insurance Integrating Mortality Improvement Risk, Interest Rate Risk, Insolvency Risk and **Insurance** Demand Hong Mao1, Krzysztof M. Ostaszewski2, Yuling Wang³ ¹Shanghai Second Polytechnic University, China ²Illinois State University, United States ³Shanghai University of Finance and Economics, China

Possibilistic Programming Decision Making in Modality Perspective

Arbaiy Nureize¹, Junzo Watada¹ ¹Waseda University, Japan

Towards a Lifecycle-oriented Planning of a Platform Portfolio

Sebastian A. Schenkl¹, Robert Orawski¹, Fatos Elezi¹, Udo Lindemann¹ ¹Technische Universitat Munchen, Germany

Decision Analysis & Methods (5)

Thu, 8 Dec 13:30 - 15:00 Room: Venus I

Chairs: Szu Hui Ng Ronnachai Sirovetnukul

Abstracts: see page 52

About Combined Non-Expansive and Potentially **Expansive Properties of a Class** of Self-Maps in Metric Spaces Manuel De La Sen¹ ¹University of Basque Country, Spain

A Preliminary Study About the Application of Multicriteria Decision Aid to the Evaluation of the Road Projects' Performance on Sustainable Safety

Renaud Sarrazin¹, Yves De Smet² ¹Universite Libre de Bruxelles, Belgian Road Research Center, Belgium ²Universite Libre de Bruxelles, Belgium

Exploration of Product Value -Characteristic Relationship: Partial Least Squares Path Modeling for Product Design and Development

Chathura Withanage¹, Taezoon Park¹, Truong Ton Hien Duc², Hae-Jin Choi³ ¹Nanyang Technological University, Singapore ²Singapore Institute of Manufacturing Technology, Singapore ³Chung-Ang University, South Korea

Comparison between Regression Analysis and Artificial Neural Network in **Project Selection.**

Oludolapo Olanrewaju¹, Adisa Jimoh¹, Pulek Kholopane² ¹Tshwane University of Technology, South Africa ²University of Johannesburg, South Africa

Application of TOPSIS Method for Evaluating the Temporal Dimensions of Marand City in Urban Design

Maliheh Hashemi¹, Mehdi Amiri-Aref² ¹Tabriz Islamic Art University, Iran ²Mazandaran University of Science & Technology, Iran

Production and Raw Material Ordering Management for a Manufacturing Supply Chain with Uncertainties

Wei Xu¹, Dongping Song¹, Michael Roe¹ ¹University of Plymouth, United Kingdom

Features Selection Approaches Combined with Effective Classifiers in Credit Scoring

Chia-Ching Lin¹, Chin-Chih Chang², Feng-Chia Li², Tzu-Chin Chao³ ¹Yu Da University, Taiwan ²Jen-Teh Junior College of Medicine, Nursing and Management, Taiwan ³Hwa Hsia College, Taiwan

Manufacturing Systems (1)

Thu, 8 Dec 15:30 - 17:30 Room: Venus I

Chairs: Zhaotong Lian Jannes Slomp

Abstracts: see page 53

Integrated Optimisation of Facilities Layout and Material Handling System Dhamodharan Raman¹ ¹CQUniversity, Australia

Model of Spine Configuration Assembly Line Design for a **Product Family**

Dida Damayanti¹, Isa Setiasyah Toha² ¹Institut Teknologi Telkom, Indonesia ²Institut Teknologi Bandung, Indonesia

Multi-objective Assembly Line Balancing Problem with Bounded Processing Times, Learning Effect, and Sequence-dependent Setup Times Nima Hamta1, Seyyed Mohammad Taghi Fatemi Ghomi¹ M. Hakimi-Asiabar¹, P. Hooshangi Tabrizi¹ ¹Amirkabir University of Technology, Iran

Optimization and Modeling of Turning Process for Aluminium - Silicon Carbide Composite Using Artificial Neural Network Models R. Jeyapaul¹, S. Sivasankar¹ ¹National Institute of Technology, India

A Framework for Evaluating Lean Implementation Appropriateness

Diogo Aurelio¹, Antonio Grilo¹, Virgilio Cruz Machado¹ ¹Universidade Nova de Lisboa, Portugal

Measuring Efficiency of Production Lines Based on Maintenance Factors ; Using DEA

Sahar Abbasi¹, Hadi Shirouyehzad¹ ¹Islamic Azad University, Iran

Comfort Study of Work Environment of Apparel Industry

Wathavana Vithanage Randika Kosala¹, Nimesha Vilasini¹, Janaka Gamage ¹University of Moratuwa, Sri Lanka

Hybrid Solving Algorithm for Complex Machine Scheduling Problem

J. Behnamian¹, Seyyed Mohammad Taghi Fatemi Ghomi¹, M. Zandieh² ¹Amirkabir University of Technology, Iran ²Shahid Beheshti University, Iran

Quality Control & Management (1)

Thu, 8 Dec 11:00 - 12:30 Room: Venus II

Chairs: Amirhossein Amiri Hendry Raharjo

Abstracts: see page 54

Developing a Framework for Six Sigma in Financial Service Institutions - Empirical **Evidence from Expert** Interviews Ayon Chakraborty¹, Michael Leyer² ¹Queensland University of Technology, Australia ²Frankfurt School of Finance & Management, Germany

Improve Burnishing Formation Yield Applying Design For Six Sigma

Jianjun Wu¹, Yizhen Wang¹, Qizhong Zhang¹, Pengpeng Huang¹ ¹Jiangxi University of Science and Technology, China

Robust Monitoring of Process Mean Vector in Female Shrouded Connector **Production: An Experience in** Malaysia Rohayu Mohd Salleh¹, Maman Djauhari1 ¹Universiti Teknologi Malaysia, Malaysia

Research of Relationship

between Tolerance Allocation and Machine Movement Chain Jiping Lu¹, Shuiyuan Tang¹, Guanghe Lu², Hao Song¹ ¹Beijing Institute of Technology, China

²CNGC Shanxi Diesel Engine Industry Co. Ltd. China

Implementation of Overall **Equipment Effectiveness in** Wire Mesh Manufacturing Ratapol Wudhikarn¹ ¹Chiang Mai University, Thailand

Strategic Management of the Triple Constraint Trade-off Dynamics - a Polarity Management Approach C. Jurie Van Wyngaard¹, H.C. Pretorius¹,

Leon Pretorius² ¹University of Johannesburg, South Africa ²University of Pretoria, South Africa

Project Management (1)

Thu, 8 Dec 13:30 - 15:00 Room: Venus II

Chairs: Leon Pretorius Norbert Trautmann

Abstracts: see page 55

Total Productive Maintenance in a Semiconductor Manufacturing Firm: An **Empirical Analysis** Kam-Choi Ng¹, Gerald Guan Gan Goh², Uchenna Cyril Eze³ ¹Infineon Technologies, Malaysia ²Multimedia University, Malaysia ³Monash University Sunway, Malaysia

Innovation Project Portfolio Management: the Case of Philips Research Sergey Filippov¹, Herman G. Mooi¹

¹Delft University of Technology, Netherlands

Project Risk Management: a New Approach

Stefan Creemers¹, Erik Demeulemeester², Stijn Van de Vonder² ¹IESEG School of Management, France ²K.U.Leuven, Belgium

Exploring Close-optimal Solutions for the Time Constrained Scheduling Problem in Project Management Christos Kiriklidis¹, Konstantios

Kirytopoulos², Elena Rokou² ¹University of Aegean, Greece ²National Technical University of Athens, Greece

Application of Real Options in **Project Portfolio Selection** Chengchao Wang¹, Yongyi Shou¹ ¹Zhejiang University, China

Risk Factors Influencing Time and Cost Overrun in Multiple D&B Projects in Malaysia: a Case Study Ramanathan Chidambaram¹,

Narayanan Sambu Potty¹, Arazi Bin Idrus ¹Universiti Teknologi Petronas, Malaysia

Project Management (2)

Thu, 8 Dec 15:30 - 17:30 Room: Venus II

Chairs: Ayon Chakraborty Anil Varma

Abstracts: see page 56

Do Project Managers Need an Operations Research Support Indeed?(A Survey on Polish **Project Managers Attitude** towards Operations Research Methods and Tools) Tomasz Blaszczyk¹ ¹University of Economics, Poland

Dynamic Fuzzy Comprehensive Evaluation of Contract **Management in Project** Department Yunna Wu¹, Yong Huang¹, Wenjun Chen¹ ¹North China Electric Power University, China

Particle Swarm Optimization for Preemptive Project Scheduling with Resource Constraints

Fei Li¹, Changtao Lai¹, Yongyi Shou¹ ¹Zhejiang University, China

An Optimization Model for the Control of Complex Turnkey **Projects in Plant Engineering** Egon Mueller¹, Ralph Riedel¹, Manuela Krones¹, Henrik Vay² ¹Chemnitz University of Technology, Germany ²MAN Diesel & Turbo SE, Germany

Team Communications and Academic R&D Performance: A Case of National **Telecommunication Program of** Taiwan

Chia-Liang Hung¹, Jerome Chih-Lung Chou², Shan-Jan Kuo¹ ¹Chi-Nan International University, Taiwan ²Hwa-Hsia Institute of Technology, Taiwan

Prioritizing Activities on a Building Site Project Luciana Alencar¹, Adiel Almeida¹, Caroline Mota¹ ¹Federal University of Pernambuco, Brazil

A Multi-Objective **Optimization and Fuzzy Prioritization Approach for** Project Risk Responses Selection

Ebrahim Rezaee Nik¹, Seyed Hessameddin Zegordi², Ahad Nazari³ ¹Tarbiat Modares University, Sadjad Institute of higher Education, Iran ²Tarbiat Modares University, Iran ³Shahid Beheshti University, Iran

A Serial Scheme for Minimizing the Duration of **Resource-Constrained Projects** within Microsoft Project Norbert Trautmann¹, Gianluca Brandinu¹ ¹University of Bern, Switzerland

Supply Chain Management (4)

Thu, 8 Dec 11:00 - 12:30 Room: Jupiter I

Chairs: Mei Qi Jun-Der Leu

Abstracts: see page 57

Reverse Logistics: Implementation in the Industrial Sector of Ecuador Arun Kumar¹, Christian Veloz¹, Roesfiansjah Rasjidin¹ ¹RMIT University, Australia

Performance-based MRO Service Contracts with Two Customer Classes Niak Wu Koh1, Roland Y. G. Lim1 ¹Singapore Institute of Manufacturing Technology, Singapore

An Effective Heuristic for Yard Template Design in Land-Scarce Container Terminals Mingkun Li¹, Shiying Li² ¹Shanghai University, The Hong Kong

Polytechnic University, China ²The University of Hong Kong, China

How the Effect of Country-of-Origin on Store Brand Moderates Customer's **Affection-Conation Link** toward Multinational Retailers Yung-Hsin Chen1, Shuo-Chang Tsai2, Yi-Shuang Wu¹, Shu-Min Li¹ ¹National Cheng Kung University, Taiwan ²Asia Univeristy, Taiwan

Information Sharing in Supply Chain: Modeling the Barriers

A. A. Pujara¹, R. Kant¹, M. D. Singh² ¹Sardar Vallabhbhai National Institute of Technology, India ²Motilal Nehru National Institute of Technology, India

Service Impact on Customer Demand and Member Profit in a Supply Chain Rasul Jamshidi¹, Seyyed Mohammad Taghi Fatemi Ghomi1

¹Amirkabir University of Technology, Iran

Supply Chain Management (5)

Thu, 8 Dec 13:30 - 15:00 Room: Jupiter I

Chairs: Qing Lu R. Kant

Abstracts: see page 58

The Resilience Paradigm in the Supply Chain Management: A Case Study Ana Paula Barroso¹, Virgínia Machado¹, Virgilio Cruz Machado¹ ¹Universidade Nova de Lisboa, Portugal

Minimizing the Vulnerabilities of Supply Chain: A new Framework for Enhancing the Resilience Umang Soni¹, Vipul Jain¹

¹Indian Institute of Technology Delhi, India

Reducing Risk in Supply Chains with Forecasting - An Analysis Richard Lackes1, Markus Siepermann1 ¹Technische Universitat Dortmund,

Germany

A Supply Chain Coordination Mechanism with Credit Option Contract Considering Backordered Demand of Customer

Reza Hasani¹, Farid Khoshalhan¹ ¹K. N. Toosi University of Technology, Iran

An Effective Lean Supply **Inventory Management Model** using VMI Hub Weidong Lin¹ ¹Temasek Polytechnic, Singapore

A New Approach in Supply Chain Modeling M. Pazoki¹, Seyyed Mohammad Taghi Fatemi Ghomi¹, Fariborz Jolai² ¹Amirkabir University of Technology, Iran ²University of Tehran, Iran

Safety, Security & Risk Management

Thu, 8 Dec 15:30 - 17:30 Room: Jupiter I

Chairs: Kai-Way Li Paolo Trucco

Abstracts: see page 59

Management Process Quality and Safety at Organizational Level (A Case Study at an International Airport) Mohammad Shahriari¹, Lennie Edman¹, K. Hamdani¹, Pedro Arezes² ¹Chalmers University of Technology, Sweden ²University of Minho, Portugal

Emergency Exposure Limits for Toxic Chemicals in Major Hazard Installations of China Hui Cui1

¹Hunan University of Science and Technology, China

Optimal Risk Response Plan of Project Risk Management Amnon Gonen1 ¹Holon Institute of Technology, Israel

Modeling a Constraint-based Design Risk Management Tool: An Empirical Study for **Collaborative Product Design** Jian Ruan¹, Sheng Feng Qin¹ ¹Brunel University, United Kingdom

IT Can Improve Healthcare Management for Patient Safety - Minimizing risk of blood transfusion with Point-of-Act-System -Masanori Akiyama¹, Atsushi Koshio¹ ¹the University of Tokyo, Japan

Occupational Safety & Health (OSH) Performance of SMEs: A Structured Framework Enrico Cagno¹, Guido Jacopo Luca Micheli¹, Celeste Jacinto², Donato Masi¹ ¹Politecnico di Milano, Italy ²Universidade Nova de Lisboa, Portugal

A Clustering Approach to the Operational Resilience Analysis of Key Resource Supply Chains (KRSC): the **Case of Fast Moving Consumer** Goods

Paolo Trucco¹, David Ward² ¹Politecnico di Milano, Italy ²JRC-ISPRA, Italy

Electrostatic Hazards of Polypropylene Powders in the Fluidized Bed Reactor

K.S. Choi¹, K.T. Moon², J.H. Chung², X. Bi³, J. R. Grace³ ¹National Institute of Occupational Safety and Health, Japan ²Seoul National University of Science & Technology, South Korea ³The University of British Columbia, Canada

Information Processing and Engineering

Thu, 8 Dec 11:00 - 12:30 Room: Jupiter II

Chairs: Bouchaib Bahli Shieuhong Lin

Abstracts: see page 60

Coordinating Time-Constrained Multi-Agent Resource Sharing with Fault Detection Shieu-Hong Lin¹ ¹Biola University, United States

A Method for Identifying Process Reuse Opportunities to Enhance the Operating Model Marne De Vries¹, Alta Van Der Merwe², Paula Kotze², Aurona Gerber² 'University of Pretoria, South Africa ²CSIR Meraka Institute, South Africa

Dynamic Partitioning for

Enterprise Applications Martin Grund¹, Jens Krueger¹, Juergen Mueller¹, Alexander Zeier¹, Hasso Plattner¹ 'Hasso-Plattner-Institute, Germany

Pitfalls of Information Technology Management Systems

Raj Siriram¹ ¹University of Witwatersrand, South Africa

Fuzzy Hierarchical Clustering

based on Fuzzy Dissimilarity YaQiong Lv¹, Carman Ka Man Lee¹ ¹Nanyang Technological University, Singapore

A Comparison of Technology Trajectories between the Global and the United States in Smart Grid

Siou-Zih Lin¹, Ssu-Han Chen¹, Chun-Chieh Wang¹, Dar-Zen Chen¹ ¹National Taiwan University, Taiwan

Technology and Knowledge Management (1)

Thu, 8 Dec 13:30 - 15:00 Room: Jupiter II

Chairs: Chien-Liang Kuo Suli Zheng

Abstracts: see page 61

Knowledge Management Implementation: Analytic Hierarchy Process Methodology R. Kant¹, A. Anand², D. P. Patel¹, M. D. Singh² ¹Sardar Vallabhbhai National Institute of Technology, India ²Motilal Nehru National Institute of Technology, India

Shared Resources, Capabilities and Inclusive Growth of Clustered SMEs: A Multiple Case Study in China Yilin Fan¹, Guowei Wan¹ ¹Zhejiang Shuren University, China

Applying K-means Clustering and Technology Map in Asia Pacific-Semiconductors Industry Analysis Chin Yuan Fan¹, M. F. Lai¹, T. Y. Huang¹, C. M. Huang¹ ¹National Applied Research Laboratories,

Taiwan

Roadmapping an Emerging Technology in Clean Energy Industry: A Case Study of Dimethyl Ether Development in China

Yuan Zhou¹, Guannan Xu¹, Jun Su¹, Tim Minshall², Qiang Zhi¹ ¹Tsinghua University, China ²University of Cambridge, United Kingdom

Structure of International Research Collaboration in Wind and Solar Energy Ichiro Sakata¹, Hajime Sasaki¹, Toshihiro

Ichiro Sakata', Hajime Sasaki', Toshihiro Inoue¹ ¹The University of Tokyo, Japan

Technology and Knowledge Management (2)

Thu, 8 Dec 15:30 - 17:30 Room: Jupiter II

Chairs: Harm-Jan Steenhuis Mohammed-Aminu Sanda

Abstracts: see page 62

A Methodology for Tracking the Impact of Changes in (re)Designing of the Industrial Complex Product Nattawut Janthong¹ ¹King Mongkut's University of Technology North Bangkok, Thailand

Dynamic Interactions between Knowledge Creation and Resource Mobilization in R&D Management: A Case of the Inkjet Innovation in Japan Ken Hashimoto¹, Shuzo Fujimura¹ ¹Tokyo Institute of Technology, Japan

Evaluation of the Sci-tech Service Industry Based on Factor Analysis - A Demonstration Study of 30 Provinces in China Hongtao Yang', Huiling Huang' 'Harbin Engineering University, China

Using Methodologies to Embed Knowledge into the Information Systems Development Process: An Investigation into the IT Sector in China Younes Benslimane¹, Zijiang Yang¹

¹York University, Canada

The Impact of Openness on Innovation Performance of China's Firms: from the Perspective of Knowledge Attributes Xiaoting Zhao¹, Liang Liang¹ 'Zhejiang University, China

Measurement and Improvement of Individual e-Business Capability Chui Young Yoon¹, Byung Hwan Kim² ¹Chungju National University, South Korea ²Korea Politec II College, South Korea

Relations between Corporate Philanthropy and Antecedent Variables: Based on the Empirical Data Xueying Tian¹ "Suzhou University of Science and Technology, China

Key Performance Indicators for Sustainable Manufacturing Evaluation in Automotive Companies Elita Amrina¹, Shari Mohd Yusof² ¹Andalas University, Indonesia ²Universiti Teknologi Malaysia, Malaysia

Facilities Planning and Management

Thu, 8 Dec 11:00 - 12:30 Room: Jupiter III

Chairs: Ching-Tsung Hung Mahdi Bashiri

Abstracts: see page 63

A Fuzzy Set

Covering-Clustering Algorithm for Facility Location Problem Rashed Sahraeian¹, Mohammad Sadeq Kazemi² ¹Shahed University, Iran ²Shahid Bahonar University of Kerman, Iran

The Scenario Based Regret and Min-Max Regret Approach for Location-allocation Model of Distribution Center, with **Uncertain Parameters** Mahdi Bashiri¹, Amir Moslemi¹ ¹Shahed University, Iran

Warehouse Storage Assignment: the Case Study of Camera and Lense Manufacturer Chompoonoot Kasemset¹, C. Rinkham¹ ¹Chiang Mai University, Thailand

A Simulated Annealing for Solving a Group Layout Design Model of a Dynamic Cellular Manufacturing System

Reza Kia¹, Reza Tavakkoli-Moghaddam², Nikbakhsh Javadian3, Mohammad Kazemi3, Javad Khorrami³ ¹Islamic Azad University, Iran ²University of Tehran, Iran ³Mazandaran University of Science and Technology, Iran

A Multi-Period Facility Location-Relocation Problem in the Presence of a Probabilistic Line Barrier

Mehdi Amiri-Aref¹, Nikbakhsh Javadian¹, Reza Tavakkoli-Moghaddam², M.Bahador Arvanezhad³ ¹Mazandaran University of Science & Technology, Iran ²University of Tehran, Iran ³Iran University of Science and Technology, Iran

Engineering Economy and Cost Analysis

Thu, 8 Dec 13:30 - 15:00 Room: Jupiter III

Chairs: Chia-Liang Hung Corrado lo Storto

Abstracts: see page 64

Production System with Respect for Variable Quantities for an Economical Electric Vehicle Production G. Schuh¹, Achim Kampker¹, Peter Burggraf¹, Carsten Nee¹ ¹University of Aachen, Germany

Cost-effective Planning of Energy-measurement-systems Egon Mueller¹, Markus Buschmann², Kai-Uwe Wonneberger² ¹Chemnitz University of Technology, Germany ²Volkswagen AG, Germany

A Review on Models and Practical Methods for Economic **Evaluation of Occupational** Safety and Health (OSH) Enrico Cagno¹, Guido Jacopo Luca Micheli¹, Donato Masi¹, Celeste Jacinto²

¹Politecnico di Milano, Italy 2Universidade Nova de Lisboa, Portugal

Survey on Energy Efficiency Measurements in Heterogenous **Facility Logistics Systems**

Christian Prasse¹, Andreas Kamagaew¹, Sebastian Gruber², Kathrin Kalischewski¹, Stefan Soter², Michael ten Hompel³ ¹Fraunhofer Institute for Material Flow and Logistics, Germany ²University of Wuppertal, Germany ³TU Dortmund University, Germany

Benchmarking in the Public Service Industry: The Italian Water Service Management Sector

Corrado lo Storto¹ ¹University of Naples Federico II, Italy

Agent-Based Simulation of Economic Sustainability in Waste-to-Material Recovery Q.Z. Yang¹, Y.Z. Sheng², Z.Q. Shen² ¹Singapore Institute of Manufacturing Technology, Singapore ²Nanyang Technological University, Singapore

Service Innovation and Management

Thu, 8 Dec 15:30 - 17:30 Room: Jupiter III

Chairs: Suhaiza Zailani Stephen Zhang

Abstracts: see page 65

The Activities and Typologies in Service Innovation Design and Deployment:A Socio-Technical Perspective on **University Based Living Lab** Hung Chih Lai¹, Kae Kuen Hu², Li Wei Chen² ¹Shih Chien University, Taiwan ²National Taiwan University, Taiwan

Service Quality, Brand Image and Price Fairness Impact on the Customer Satisfaction and Loyalty

Chi-Chuan Wu¹, Shu-Hsien Liao², Yin-Ju Chen², Wei-Lun Hsu¹ ¹University of Tatung, Taiwan ²Tamkang University, Taiwan

The Feasibility of System Dynamic Modeling in Value Assessment of Industrial Services

Ville Ojanen¹, Samuli Kortelainen¹, Sakari Hyppanen² ¹Lappeenranta University of Technology, Finland ²Capgemini Finland, Finland

Intermediating R&D and Marketing Value Creation by **Open Innovation**

Shu Wang¹, Jin Chen¹, Fang Xie¹ ¹Zhejiang University, China

The Connection Between **Customer Value Creation and Innovation Strategy: A** Proposed Framework and Its Implication in Fashion Products

Chien-Liang Kuo¹, Chien Chiang Lin², Yen-Kwan Wu³ ¹Chinese Culture University, Taiwan ²Shih Hsin University, Taiwan ³Industrial Technology Research Institute, Taiwan

Service Innovation for the User Interface of an ATM Catering to the Needs of the Student Community

Girish Krishnan¹, Sanjay Kumar¹, Jithin C.R.¹, Vinay V. Panicker¹, R Sridharan¹ ¹National Institute of Technology Calicut, India

Adoption of New Service **Development Tools in the Financial Service Industry** Dayu Jin1, Kah-Hin Chai1, Kay-Chuan

Tan¹ ¹National University of Singapore, Singapore

Identification of Best Practices to Achieve Innovation, Corporate Entrepreneurship and Spinoff in Chilean Companies

Alfonso Bastias¹, Patricio Cortes¹ ¹Universidad del Desarrollo, Chile

Poster Session 2

Thu, 8 Dec Room: Venus III

- p.66 Application of Fuzzy Mathematical Programming to Optimize an Integrated Production-distribution System Fardin Ahmadizar¹, Mehdi Zeynivand¹ 'University of Kurdistan, Iran
- p.66 **Supplier Development: a Decision Making Problem** Zahra Sharafi¹, Jamshid Parvizian² ¹MAPNA Group, Iran ²Isfahan University of Technology, Iran
- p.66 Application of Fuzzy-AHP Extent Analysis for Supplier Selection in an Apparel Manufacturing Organization Mohammad Mahmudur Rahman¹, Kazi Badrul Ahsan¹ ¹Khulna University of Engineering and Technology, Bangladesh
- p.66 A Model for Evaluating Lean, Agile, Resilient and Green Practices Interoperability in Supply Chains Pedro Espadinha-Cruz¹, Antonio Grilo¹, Rogerio Puga-Leal¹, Virgilio Cruz Machado¹ ¹Universidade Nova de Lisboa, Portugal
- p.66 Arena Simulation Model for Multi Echelon Inventory System in Supply Chain Management Kunal Patil¹, Kai Jin¹, Hua Li¹ ¹Texas A&M University-Kingsville, United States
- p.66 Stability of Production Lines with Multiple Delays Narthan Cemal Saadet¹, Ali Fuat Ergenc¹ ¹Istanbul Technical University, Turkey
- p.66 Fuzzy Guidance Strategies for Fair Multi-Agent Negotiation of Wholesale Price Contracts Omar Kallel¹, Ines Ben Jaafar¹, Lionel Dupont², Khaled Ghedira¹ ¹Universite de Tunis, Tunisia ²Universite de Toulouse, France
- p.66 A Simulation Comparison Analysis of Effective Pallet Management Scenarios Maria Grazia Gnoni¹, Gianni Lettera¹, Alessandra Rollo¹ ¹University of Salento, Italy
- p.67 Does Topology Matter? Land Price and Road Network Satoru Yamamoto¹, Yuya Kajikawa¹ ¹The University of Tokyo, Japan
- p.67 Market Information, Scope Economies, and Make-or-Buy Decision under Information Asymmetry Suxiu Xu¹, Qiang Lu¹, Xiaoming Hu¹ ¹Harbin Institute of Technology, China
- p.67 Developing a New Consumption Experience Scale for Taiwanese Fine Foods Culture Ching-Yu Lien¹, Shu-Hwa Hsiao¹

Ching-Yu Lien¹, Shu-Hwa Hsiao¹ ¹Minghsin University of Science and Technology, Taiwan

- p.67 A Model for Carbon Management of Supplier Selection in Green Supply Chain Management Chia-Wei Hsu¹, S. H. Chen², Cherng-Ying Chiou³ ¹Tungnan University, Taitvan ²National Taipei University of Technology, Taitvan ³Overseas Chinese University, Taitvan
- p.67 **The ADT Evaluation Method Based on MCMC** Lizhi Wang¹, Xiaoyang Li¹, Tongmin Jiang¹, Xiaotian Zhuang² ¹Beihang University, China ²Arizona State University, United States
- p.67 The Impacts of Common Cause Failures for Two-Unit Parallel Systems from RAMS+C Point of View Chun-Yuan Cheng¹, Min Wang¹, Bee Leng Lee² ¹Chaoyang University of Technology, Taiwan ²San Jose State University, United States
- p.67 Redundancy Allocation for Series-Parallel Warm-Standby Systems O. Tannous¹, L. Xing¹, P. Rui², Min Xie², S.H. Ng² ¹University of Massachusetts, United States ²National University of Singapore, Singapore
- p.67 Simulation-Assisted Estimation of Failure Models with Stochastic Hazard Rates Ke Sun¹, Songlin Chen¹, Zhang Wu¹ ¹Nanyang Technological University, Singapore
- p.68 A Multi-Objective Identical Parallel Machine Scheduling with Setup and Removal Times with Deteriorating and Learning Effects Alireza Amini¹, Reza Tavakkoli-Moghaddam¹, Fardad Niakan¹ ¹University of Tehran, Iran
- p.68 Genetic Algorithms and the Cutting Stock Problem Mohsin Malik¹, John Taplin¹, Min Qiu¹ ¹University of Western Australia, Australia
- p.68 A Genetic Algorithm Approach for Modelling and Optimisation of MAJSP- Part II:GA Operators and Results Roohollah Milimonfared¹, Romeo Marian¹, Zeinab Hajiabolhasani¹ ¹University of South Australia, Australia
- p.68 Examination of the Effectiveness and Robustness of the Heuristics for Bay-based Quay Crane Scheduling Problem in Port Container Terminals Jiang Hang Chen¹, Stephen Zhang², D.H. Lee¹ ¹National University of Singapore, Singapore ²Pontifical Catholic University of Chile, Chile

- p.68 Improving Dispatch Operations in Complex Courier Organizations Laura Paulina Lara Avila¹, Fatos Elezi², Maria Caridi³, Udo Lindemann² ¹Daimler, Mexico ²Technische Universitat Munchen, Germany ³Politecnico di Milano, Italy
- p.68 Project Management for Small Wind Turbines: an Experimental Survey on Activities, Lead Times and Risks Marcello Fera¹, Roberto Macchiaroli¹, Salvatore Miranda² ¹Second University of Naples, Italy ²University of Salerno, Italy
- p.68 Composing a Technology Delivery System for an Emerging Energy Technology: The Case of Dye-Sensitized Solar Cells Ying Guo¹, Xuefeng Wang¹, Donghua Zhu¹ ¹Beijing Institute of Technology, China
- p.68 Innovation Risk-utility Pathway Method Applied to Dye-sensitized Solar Cells Ying Guo¹, Xuefeng Wang¹, Donghua Zhu¹ ¹Beijing Institute of Technology, China
- p.69 Full Service Vehicle Manufacturing: Rise and Fall Alan Pilkington¹, Luciano Ciravegna¹ 'University of London, United Kingdom
- p.69 A Prescriptive Approach to Understand Customer Needs Using Value-focused Thinking Xinwei Zhang¹, Guillaume Auriol¹, Claude Baron¹ 'University of Toulouse, France
- p.69 **Investment Center Framework** Romeo G. Manalo¹, Marivic V. Manalo² ¹Manila Electric Company, Philippines ²De La Salle University, Philippines
- p.69 Robustness and Reliability Consideration in Product Design Optimization Under Uncertainty Xiaotian Zhuang¹, Rong Pan¹, Lizhi Wang² ¹Arizona State University, United States ²Beihang University, China
- p.69 System Dynamics Modeling for EFQM Excellence Model: Case Study of a Regional Electricity Company in Iran Mohammad Dehghani Saryazdi¹, Kazem Noghondarian², Mohammad Saleh Owlia¹, Jamal Hosseini Azabadi² ¹Yazd University, Iran ²Iran University of Science and Technology, Iran
- p.69 **Control Chart for Monitoring Dependent Binomial Processes** Tsen-I Kuo¹, Cheng-Shih Lin¹, Tung-Tsan Chen¹, Hsin-Hua Hung¹ ¹National Quemoy University, Taiwan
- p.69 System Integration Issues Causes, Consequences & Mitigations

Adalberto Coelho Silva¹, Geilson Loureiro¹ ¹National Institute for Space Research, Brazil p.69 Process Cascade- and Segmentation-Based Organizational Design: A Case Study Markus Kohlbacher¹, Doris Weitlaner¹ ¹University of Applied Sciences CAMPUS

02, Austria

- Determining Economic Manufacturing Quantity, the Optimum Process Parameters p.70 Based on Taguchi Quadratic Quality Loss Function Under Rectifying Inspection Plan Ismail Al-Me'raj¹, Yahya Cinar¹, Salih Duffuaa¹ ¹King Fahd University of Petroleum and Minerals, Saudi Arabia
- Identifying Quality Improvement Opportunities in a Manufacturing Enterprise p.70 Stanley Fore¹ ¹Cape Peninsula University of Technology, South Africa

An EWMA –Based Method for Monitoring Polytomous Logistic Profiles p.70 Hamidreza Izadbakhsh¹, Rassoul Noorossana¹, Marzieh Zarinbal², Amir Zarinbal³, Mohammad Reza Safaian⁴, Majid Chegeni⁵ ¹Iran University of Science and Technology, Iran ²Amirkabir University of Technology, Iran ³University of Waterloo, Canada ⁴Expert of Water and Wastewater

Company, Iran ⁵Azad Islamic University, Iran

E-Business and E-Commerce

Fri, 9 Dec 08:30 - 10:30 Room: Venus I

Charles Mbohwa Chairs: Pei-Lee Teh

Abstracts: see page 71

A Procurement Model in an **Electronic Market with Coordination Costs** Jishnu Hazra¹, B. Mahadevan¹ ¹Indian Institute of Management, India

E-business and E-commerce Applications and Trends in the **Retailing Sector in Zimbabwe** Charles Mbohwa¹, Batanai Sammie²

¹University of Johannesburg, South Africa ²University of Zimbabwe, Zimbabwe

MOA and TRA in Social **Commerce: An Integrated** Model

Pei-Lee Teh¹, Pervaiz Khalid Ahmed² ¹Multimedia University, Malaysia ²Monash University, Malaysia

The Effects of Psychological Factors on Online Consumer Behavior

Shu-Hsien Liao1, Yu-Chun Chung1 ¹Tamkang University, Taiwan

The Research on Relationships between Customers' Perceived Value and Repurchase Intention

Yiming Xiang¹, Lili Li², Xin Zhong³ ¹ZheJiang Gongshang University, China ²the University of Manchester, United Kingdom ³the University of Bridgeport, United States

Information Architecture for

Online Review System G. Rajesri¹, P. Laras Ayutirta¹ ¹Bandung Insitute of Technology, Indonesia

DMTT - An Approach for **Business Document Mapping** and Transformation in B2BCollaboration

Wen Jing Yan¹, Chong Minsk Goh¹, Puay Siew Tan¹, Valliappan Ramasamy¹ ¹Singapore Institute of Manufacturing Technology, Singapore

Influencing Factors of Consumer Intention towards **Web Group Buying** Guobiao Xie¹, Jie Zhu¹, Qiang Lu¹, Suxiu

Xu¹ ¹Harbin Institute of Technology, China

Manufacturing Systems (2)

Fri, 9 Dec 11:00 - 13:00 Room: Venus I

Chairs: Elesandro Baptista

Abstracts: see page 72

A Two-Stage M/G/1 Queue with Discretionary Priority Zhaotong Lian¹, Ning Zhao² ¹University of Macau, China ²Kunming University of Science and

Technology, China

Heuristic Algorithm for Two-sided Assembly Line Balancing Problem with Multi-objectives Xiaofeng Hu¹ ¹Shanghai Jiao Tong University, China

Considering Decision Maker Ideas in Product Mix Problems **by Goal Programming** Fahimeh Tanhaie¹, Nasim Nahavandi¹ ¹University of Tarbiat Modarres, Iran

Optimization of Multi-skilled Operator Allocation to Minimize Inventory Waiting Time

Adam Brown¹, Fazleena Badurdeen¹ ¹University of Kentucky, United States

Application of Data Mining Techniques to Monitor the Network-controllable Robot's Performance

James Yongjin Kwon¹, Yongmin Park¹, Jungwan Hong¹ ¹Ajou University, South Korea

Average Flow Time Estimation of Jobs in a Flexible Manufacturing Cell Consisting of a Number of Identical Machines Jannes Slomp¹, Jos A.C. Bokhorst¹,

Rahul Capriĥan² ¹University of Groningen, Netherlands ²Dayalbagh Educational Institute, India

Numerical Simulation and **Experimental Verification of Electrode Life for Different Coolants and Its Flow in Plasma**

Cutting Torch M. Senthil Kumar¹, B. Dhanasekar², G. Ranga Janardhana¹, S. Paramasivam³, K. S. Jaya Kumar⁴ ¹Jawaharial Nehru Technological University, India ²General Motors, India ³ESAB India Ltd, India ⁴S.S.N College of Engineering, India

An Events-driven Scheduling Algorithm for Two-cluster **Tools with Processing Time** Windows

Xin Li¹, Richard Y. K. Fung¹, Hongyi Sun1

¹City University of Hong Kong, China

An Efficient Tabu Search Approach to Determine Cell Formation Problem with **Consideration of Cell Layout** Chia-Ching Lin1, Chin-Chih Chang2, Feng-Chia Li² ¹Yu Da University, Taiwan ²Jen-Teh Junior College of Medicine, Nursing and Management, Taiwan

Quality Control & Management (2)

Fri, 9 Dec 08:30 - 10:30 Room: Venus II

Chairs: Jianjun Wu Zhang Wu

Abstracts: see page 73

Optimization of Multiresponse Problems using Process Capability Index for Batch Manufacturing Processes Amirhossein Amiri¹, Mahdi Bashiri¹, Hamed Mogouie¹ ¹Shahed University, Iran

Implementation of Environmental Management in the Austrian Transport Sector -Do Manager's Attitudes Matter?

Elmar Furst¹, Peter Oberhofer¹ ¹Institute of Transport and Logistics Management, Austria

Email Network Analysis for Leadership

Hisato Tashiro¹, Antonio Lau¹, Junichi Mori1, Nobuzumi Fujii2, Yuya Kajikawa1 ¹The University of Tokyo, Japan ²Waseda University, Japan

TQM Organizational Development for a Global Manufacturer

Kiyoshi Suzuki¹, Hisato Tashiro², Nobuzumi Fujii³, Masayoshi Ushikubo¹, Ichiro Sakata² ¹Sanden Corporation, Japan ²The University of Tokyo, Japan ³Waseda University, Japan

Process Capability Analysis for Non-normal Distribution with Lower Specification Limit

Duygu Korkusuz¹, Hendry Raharjo¹, Bo Bergman¹ ¹Chalmers University of Technology, Sweden

Synthetic-np Chart for Attributes

Salah Haridy¹, Zhang Wu¹ ¹Nanyang Technological University, Singapore

Controlling Non-conformities Propagation in Manufacturing. Case Study in an **Electromechanical Assembly** Plant

Valerie Fiegenwald¹, Samuel Bassetto², Michel Tollenaere1 ¹Laboratoire GSCOP, France ²Ecole Polytechnique de Montreal. Canada

Quality Control & Management (3)

Fri, 9 Dec 11:00 - 13:00 Room: Venus II

Avon Chakraborty Chairs: Mahdi Bashiri

Abstracts: see page 74

Profile Monitoring for Poisson Responses

Amirhossein Amiri¹, Mehdi Koosha¹, Armaghan Azhdari² ¹Shahed University, Iran ²Payam Noor University, Iran

The Effect of an Additional **Observation on Covariance** Structure Maman Djauhari¹

¹Universiti Teknologi Malaysia, Malaysia

Effect of Seemingly Unrelated Regression-based Modeling Approach on Solution Quality for Correlated Multiple **Response Optimization** Problems Sasadhar Bera¹, Goutam Barman¹, Indrajit Mukherjee¹ ¹Indian Institute of Technology, India

Heuristic and Metaheuristic Structure of Response Surface Methodology in Process Optimization

Mahdi Bashiri¹, Farshid Samaei¹ ¹Shahed University, Iran

The impact of Tolerance Limit on Cost of Quality

Mohamed K. Omar¹, Sharmeeni Murugan², Rohana Abdullah³ ¹Nottingham University Malaysia, Malausia ²Multimedia University Melaka (MMU), Malaysia ³Universiti Teknikal Malaysia Melaka, Malaysia

Decision-making in Process Design Based on Failure **Knowledge** Wei Dai¹, Jun Yang¹ ¹Beihang University, China

Economic Process Control for Multivariate Quality Characteristics with Hotelling's T-squared Charts under Gamma Shock Model Feng-Chia Li¹, Peng-Kai Wang², Li-Lon Yeh², Sheng-Wen Hong² ¹Jen-Teh Junior College of Medicine,

Nursing and Management, Taiwan ²Hwa Hsia Institute of Technology, Taiwan

Reliability and Maintenance Engineering (1)

Fri, 9 Dec 08:30 - 10:30 Room: Jupiter I

Om Prakash Yaday Chairs: Jayantha Prasanna Liyanage

Abstracts: see page 75

Integration of Maintenance Stategies for Improved Asset **Reliability and Availability** N. K. K. Prasanna¹, Shakti Akula¹, Tushar N. Desai² ¹Reliance Industries Ltd., India ²National Institute of Technology, India

Increasing Availability of Production Systems in Robust Layouts via Assignment of Maintenance Resources Majid Bazrafshan¹, Shahrzad Nikghadam¹, Shaomin Wu² ¹University of Tabriz, Iran ²Cranfield University, United Kingdom

Reuse Oriented Group Maintenance Scheduling Based on Hybrid Genetic Algorithm and Tabu Search Jihong Yan1, Dingguo Hua1, Zimo Wang¹ ¹Harbin Institute of Technology, China

State Space Model Based Reliability and Sensitivity Analysis for Multistage **Manufacturing Process**

Faping Zhang¹, Aiqing Chen², Hong Jing³, Yan Yan¹, Hanbo Qian⁴ ¹Beijing Institute of Technology, China ²Jiaozuo Normal College, China ³Shanxi Diesel Engine Co. Ltd, China ⁴Center of Coordination & Support of Costind, China

Software Reliability Modelling and Optimization for Multi-release Software **Development Processes** Qingpei Hu¹, P. Rui², Min Xie², S.H. Ng²,

Gregory Levitin³ ¹Chinese Academy of Sciences, China ²National University of Singapore, Singapore ³The Israel Electric Corporation Ltd., Israel

Multi Up-gradation Software Reliability Growth Model with Faults of Different Severity Amir Hossein Soleiman Garmabaki1, Anu.G Aggarwal², Pramod Kumar

Kapur² ¹Islamic Azad University, Iran ²University of Delhi, India

Performance-based Burn-in for Products Sold with Warranty Zhisheng Ye1, Loon Ching Tang1, Min

¹National University of Singapore, Singapore

System Dynamics Simulation for Constructing Maintenance Management of Ship

Machinery Dhimas Handani¹, Kenji Ishida¹, Shintaro Nishimura¹, Surya Hariyanto¹ ¹Kobe University, Japan

Reliability and Maintenance Engineering (2)

Fri, 9 Dec 11:00 - 13:00 Room: Jupiter I

Faping Zhang Chairs: Qingpei Hu

Abstracts: see page 76

Reliability of Surveillance Mission with Unmanned Aerial Vehicles

Kien Ming Ng¹, Jun Jiang¹, Rui Peng¹, Kim Leng Poh¹, Kwong Meng Teo¹ ¹National University of Singapore, Singapore

Reliability-based Robust Design Optimization: A Comparative Study Vijay Rathod¹, Om Prakash Yadav², Ajay Pal Singh Rathore¹, Rakesh Jain¹ ¹Malaviya National Institute of Technology, India

²North Dakota State University, United States

Exploring Impacts of Single Failure Propagation between SCADA and SUC Cen Nan¹, Irene Eusgeld¹ ¹ETH Zurich, Switzerland

Human Factor in Maintenance **Performance Measurement**

Diego Galar¹, Christer Stenstrom¹, Aditya Parida¹, Rupesh Kumar¹, Luis Berges² ¹Lulea University of Technology, Sweden ²University of Zaragoza, Spain

A Maintenance Service **Contract for A Warranted** Product

Hennie Husniah¹, Udjianna S. Pasaribu², Abdul Hakim Halim², Bermawi Iskandar²

¹Bandung Institute of Technology, Langlangbuana University, Indonesia ²Bandung Institute of Technology, Indonesia

Expert-Based FMEA of Wind Turbine System

Milton Kumar Das¹, Subhash Chandra Panja², Sunetra Chowdhury³, Shyamapada Chowdhury³, Andreas I Elombo⁴ ¹Indian Maritime University, India

²Jadavpur University, India ³University of Cape Town, South Africa ⁴University of Stellenbosch, South Africa

Condition-based Maintenance for Systems Under Dependent **Competing Failures** Liangpen Chen¹, Zhisheng Ye¹, Boray

Huang¹ ¹National University of Singapore, Singapore

Technology and Knowledge Management (3)

Fri, 9 Dec 08:30 - 10:30 Room: Jupiter II

Ichiro Sakata Chairs: Chin Yuan Fan

Abstracts: see page 77

A Model for Linking Knowledge Management Strategies, Critical Success Factors, Knowledge Management Practices and Organizational Performance; the case of Iranian Universities Afarin Akhavan¹, Mohammad Saleh Owlia¹, Mostafa Jafari², Yahya Zare¹ ¹Yazd University, Iran ²Iran University of Science & Technology,

Identifying Mapping Relationships between Functions and Technologies: an Approach based on Association **Rule Mining** Linda Zhang¹, Roger Jiao² ¹IESEG School of Management, France ²Georgia Institute of Technology, United States

Ranking of Technology Transfer Barriers in Developing Countries; Case Study of Iran's **Biotechnology Industry** Khashayar Yazdani¹, Kourosh Yazdani Rashvanlouei², K. Ismail¹ ¹University Technology Malaysia, Malaysia ²Sharif University of Technology, Iran

Managing Supply Chain Knowledge in the New Product **Development Process: a Social** Network Analysis Approach Marianna Marra¹, William Ho¹, John S. Edwards¹ ¹Aston University, United Kingdom

An Ontological Approach for Program Management Lessons Learned: Case Study at Motorola Penang Design Centre Yu-N Cheah¹, Soo Beng Khoh², Ghee Beng Ooi²

¹Universiti Sains Malaysia, Malaysia ²Motorola Technology Sdn. Bhd, Malaysia

Optimization of a Knowledge-based System by a Meta-heuristic Approach for the Automotive Diagnosis Armin Azarian¹, Ali Siadat¹, Patrick Martin ¹Arts et Metiers ParisTech, France

Defining Technology Entrepreneurship Markus Spiegel¹, Christian Marxt¹ ¹University of Liechtenstein, Liechtenstein

Towards the Integration of Technological, Organizational and Human Subsystems of Organizations to Enhance Productivity Mohammed Aminu Sanda¹, Jan Iohansson¹

¹Lulea University of Technology, Sweden

Technology and Knowledge Management (4)

Fri, 9 Dec 11:00 - 13:00 Room: Jupiter II

Chui Young Yoon Chairs: Chien-Liang Kuo

Abstracts: see page 78

Identification and **Classification of Human Error** in Process Model Development Alexander Nielen¹, Denise Kolter¹, Susanne Mutze-Niewohner¹, Christopher M. Schlick¹ 1RWTH Aachen University, Germany

Technological Capability Building in Network **Environments: the Moderating** Effects of Governance Structure Suli Zheng¹, Zengyuan Wu¹ ¹China Jiliang University, China

Open Innovation in Chinese High-tech Enterprises: An Empirical Research Based on Zhejiang Province Fang Liu¹, Gang Zheng¹ ¹Zhejiang University, China

The Paradoxical Property of **Knowledge in Organizations** J. Ajith Kumar¹

¹T. A. PAI Management Institute, India

Technology Manager's Radar Screen: Monitoring Competitors' Innovation Performance Chung-Huei Kuan¹, Huei-Ru Dong¹, Mu-Hsuan Huang¹, Dar-Zen Chen ¹National Taiwan University, Taiwan

The Impact of Absorptive Capacity on the Ex-Post Adoption of Agile Methods: The Case of Extreme **Programming Model** Bouchaib Bahli¹, Younes Benslimanne², Zijiang Yang² ¹ESC-Rennes School of Business, France ²York University, Canada

Technology, Quality and Trade in the Apple Industry Kayla Lopuch¹, Laura Syrett¹, John Conrad¹, Harm-Jan Steenhuis¹ ¹Eastern Washington University, United States

Systems Modeling and Simulation (1)

Fri, 9 Dec 08:30 - 10:30 Room: Jupiter III

Ville Ojanen Chairs: Maria Grazia Gnoni

Abstracts: see page 79

A Robust-Gain-Scheduled Methodology for Process Parameter Design and Control with Application to a Carbonated Beverage Filling Process Abdul-Wahid A. Saif¹, Muneeb A. Akram¹ ¹King Fahd University of Petroleum & Minerals, Saudi Arabia

Design and Modeling of Roll-to-Roll Manufacturing System Using Simulation Techniques

Laura Xiao Xia Xu¹, Chin Wei Gan¹, Feng Yu Wang¹, Ma Bin¹, Roland Lim¹ ¹Singapore Institute of Manufacturing Technology, Singapore

Design of Comminution Circuits for Improved Productivity Using a Multi-Objective Evolutionary

Algorithm (MOEA) Samson Mhlanga¹, Jabulani Ndlovu², Charles Mbohwa¹, Michael Mutingi³ ¹University of Johannesburg, South Africa ²National University of Science and Technology, Zimbabwe ³National University of Singapore, Singapore

Systems Thinking for Modeling Risk Propagation in Supply Networks

Abhijeet Ghadge¹, Samir Dani¹, Roy , Kalawsky¹ ¹Loughborough University, United Kingdom

A UML Approach for the Design of Reconfigurable Manufacturing Simulation Models

Hossam S. Ismail¹, Voon S. Tey¹, Lina Wang¹, Jenny Poolton¹ ¹The University of Liverpool, United Kingdom

Bayesian Calibration of Stochastic Computer Models Jun Yuan¹, S.H. Ng¹ ¹National University of Singapore, Singapore

Wafer Lot Release Policies Based on the Continuous and **Periodic Review of WIP Levels** Khaled S. El-Kilany¹ ¹Arab Academy for Science, Technology, and Maritime Transport, Egypt

A Framework for Solving the **Optimal Display Quantities**

with Equality Constraint Takuya Suganuma', Hiroyuki Goto² 'Nagaoka University of Technology, Japan ²Hosei University, Japan

Systems Modeling and Simulation (2)

Fri, 9 Dec 11:00 - 13:00 Room: Jupiter III

Chairs: Arun Kumar Carman Lee

Abstracts: see page 80

Principles for Modelling Business Processes Antonie van Rensburg¹ ¹University of Pretoria, South Africa

Resolution of Resource Conflict in a Max-Plus Linear Representation -Case of a Single Project-Shotaro Yoshida¹, Hirotaka Takahashi², Hiroyuki Goto³ ¹Nagaoka University of Technology, Japan ²Yamanashi Eiwa College, Japan ³Hosei University, Japan

A Queuing System with Risk-Averse Customers: Sensitivity Analysis of Performance Carlos Arturo Delgado¹, Ann van Ackere¹, Erik Larsen² ¹University of Lausanne, Switzerland ²University of Lugano, Switzerland

Balancing Multi-robot Prioritized Task Allocation: a Simulation Approach M. Elango¹, S.P. Nachiappan¹ ¹Thiagarajar College of Engineering, India

Modeling Patient Visits to Accident and Emergency Department in Hong Kong M. Xu¹, T. C. Wong¹, K. S. Chin¹, S. Y. Wong¹, K. L. Tsui¹ ¹City University of Hong Kong, China

Evaluation of a Supply Chain Performance Using a Fuzzy Decision Support System Isabel L. Nunes¹, Sara Figueira¹, Virgilio Cruz Machado¹ ¹Universidade Nova de Lisboa, Portugal

Assessing Quality of Manufacturing Organizations -A Graph Theoretic Approach Mohit Singh¹, I.A. Khan², Sandeep Grover³, S.C. Gupta¹ ¹Northern India Engineering College, India ²Jamia Millia Islamia, India ³YMCA University of Science & Technology, India

On Storage Capacity Pooling through the Supply Hub in Industrial Park (SHIP): The Impact of Demand Uncertainty Xuan Qiu¹, George Q. Huang¹ ¹The University of Hong Kong, China

Poster Session 3

Fri, 9 Dec Room: Venus III

- p.81 Efficiency Improvement on Job Scheduling by Using Genetic Algorithm: A Case Study in Electronic Industry Budtree Limwanich¹, Rati Wongsathan¹ 'North-Chiang Mai University, Thailand
- p.81 Process Family Planning: a Methodology Integrating Petri Nets and Knowledge-based Systems Linda Zhang¹, Qianli Xu² ¹IESEG School of Management, France ²Institute for Infocomm Research, A*STAR, Singapore
- p.81 Shifting Economic Bottleneck Identification Junqiang Wang¹, Jian Chen¹, Shuo Wang¹, Yingfeng Zhang¹, Shudong Sun¹ ¹Northwestern Polytechnical University, China
- p.81 Coordination Policies in Product Development with Rework Bingyin Bao¹, Suxiu Xu¹, Qiang Lu¹ 'Harbin Institute of Technology, China
- p.81 Research of Supplier Fuzzy Evaluation Based on Customer Satisfaction Minghai Jiao¹, Xueying Hong¹, Ping Yan², Long Ren¹ ¹Northeastern University, China ²Shenyang Aerospace University, China
- p.81 A Study on Audit Fees Decision Making: Evidence from China Stock Market Xin Li¹, Xiaobo Zhu² ¹Chongqing University of Technology, China ²Bridgestone Europe NV/SA (Belgium), Belgium
- p.81 Data Pre-Processing by Genetic Algorithms for Bankruptcy Prediction Chih-Fong Tsai¹, Jui-Sheng Chou² ¹National Central University, Taiwan ²National Taiwan University of Science and Technology, Taiwan
- p.81 **To Form a Smaller World in the Research Realm of Hierarchical Decision Models** Bing Wang¹, Xiaotian Yao¹ ¹Beijing University of Posts & Telecommunications, China
- p.82 Threat Evaluation Model of Targets Based on Information Entropy and Fuzzy Optimization Theory Li-Ying FENG¹, Qing XUE¹, Min-xia LIU¹ ¹Beijing Institute of Technology, China
- p.82 Study of Deformation and Compensation for Ram-Quill Type Spindle Chia-Hui Tang¹, Ching-Feng Chang¹, Tsair-Rong Chen¹ ¹National Changhua University of Education, Taivan

- p.82 Fuzzy Classification of Gas Power Plant Spare Parts by Combination Statistical Classification Technique, SAW, ABC Analysis Shahrokh Hematyar¹ 'MAPNA, Iran
- p.82 The Impact of Work Design Concept on Manufacturing Performance: A Process Sector Case Study Nimesha Vilasini¹, Udaya Kahangamage¹, Janaka Gamage¹, Wathavana Vithanage Randika Kosala¹ ¹University of Moratuwa, Sri Lanka
- p.82 Designing an Integrated Order Fulfillment System for Configure-to-Order Production Linda Zhang¹, Qianli Xu² ¹IESEG School of Management, France ²Institute for Infocomm Research, A*STAR, Singapore
- p.82 Planning Process Families with a Knowledge-based System Linda Zhang¹, Qianli Xu², Yongyi Shou³ ¹IESEG School of Management, France ²Institute for Infocomm Research, A*STAR, Singapore ³Zhejiang University, China
- p.82 Performance Evaluation of Knowledgeable Manufacturing Systems Using Petri Nets Considering Dynamic Events Youlong Lv¹, Jie Zhang¹ ¹Shanghai Jiao Tong University, China
- p.82 Using Bayesian Networks and Importance Measures to Indentify Tumour Markers for Breast Cancer Shubin S¹¹, Guanmin Liu¹, Zhiqiang Cai¹, Peng Xia² ¹Northwestern Polytechnical University, China ²Xi'an Jiaotong University, China
- p.83 **Identifying Critical Business Rules Using Rough Set Theory** Mohamad Aghdasi¹, Ehsan Malihi¹, Fatemeh Ghorbani¹ ¹Tarbiat Modares University, Iran
- p.83 Apply HLM to Analyze Government Policies Influence the Accessibility Of Sidewalks Ching-Tsung Hung¹ 'University of Kainan, Taiwan
- p.83 Confidence Interval Estimation of Software Reliability Growth Models Derived from Stochastic Differential Equations Chih-Chiang Fang¹, Chun-Wu Yeh² ¹Shu-Te University, Taitwan
- p.83 A Genetic Algorithm Approach for Modelling and Optimisation of MAJSP- Part I:Modeling Roohollah Milimonfared¹, Romeo Marian¹, Zeinab Hajiabolhasani¹ 'University of South Australia, Australia

- p.83 On The Development of Adoption of Newer Successive Technologies Using Stochastic Differential Equation P.C. Jha¹, Kuldeep Chaudhary¹, Anshu Gutpa¹ 'University of Delhi, India
- p.83 A Framework Algorithm for a Real-World Variant of the Vehicle Routing Problem Vu Pham¹, Tien Dinh¹ ¹University of Science, Viet Nam
- p.83 A Branch and Cut Algorithm for the Multi-Vehicle One-to-One Pickup and Delivery Problem with Split Loads Temel Oncan¹, Dilek Tuzun Aksu², Guvenc Sahin³, Mustafa Sahin³ ¹Galatasaray University, Turkey ²Yeditepe University, Turkey ³Sabanci University, Turkey
- p.83 Research on Rapid Design Plan For Engine Based on Human Factors Engineering Han Yu¹, Qing Xue¹, Minxia Liu¹ ¹Beijing Institute of Technology, China
- p.84 **Towards Human Stability in Transport Systems** Philippe Richard¹, Vincent Benard¹, Frederic Vanderhaegen², Patrice Caulier² 'IFSTTAR, France ²LAMIH, CNRS, France
- p.84 Work Motivation and Job Performance of Frontline Employees: the Mediating Role of Organizational Commitment Panagiotis Trivellas¹ ¹Technological Educational Institute of Chalkis, Greece
- p.84 The Human Factors Analysis of Marine Accidents Based on Goal Structure Notion Tingting Dai¹, Haiyan Wang¹ ¹Wuhan University of Technology, China
- p.84 Situational Awareness Needs for System Interaction Design D'oria Rosli¹, Azizah Abdul Rahman², Rose Alinda Alias² ¹Universiti Tun Hussein Onn Malaysia, Malaysia ²Universiti Teknologi Malaysia, Malaysia
- p.84 A Design of 3D Modeling Virtual Fitting Project for Online Shopping Pangli Zuo¹, Yi Zhao² ¹Beijing Institute of Technology, China ²Beijing University of Posts and Telecommunications, China
- p.84 Achieving Platform Leadership: Application of Inverting and Porting in System Development Jerome Chih-Lung Chou¹, Chia-Liang Hung², W. T. Li² ¹Hwa-Hsia Institute of Technology, Taiwan ²Chi-Nan International University, Taiwan
- p.84 Uncertainty Analysis on Number of Fatalities in Building Fires Guanquan Chu¹, Jinhui Wang² ¹Waterborne Transportation Institute, Ministry of Transport, China ²Shanghai Maritime University, China

- p.84 Composable Correlation Mining of Cloud Service in Cloud Manufacturing Hua Guo¹, Lin Zhang¹, Fei Tao¹, Zhiyun Ren¹, Yongliang Luo¹ ¹Beihang University, China
- p.85 Energy Adaptive Immune Genetic Algorithm for Collaborative Design Task Scheduling in Cloud Manufacturing System Yuanjun Laili¹, Lin Zhang¹, Fei Tao¹ ¹Beihang University, China
- p.85 **Design of a Lean Development** Framework U. Dombrowski¹, Thimo Zahn¹ ¹Technische Universitat Braunschweig, Germany
- p.85 Study on the Variation and Survival Factors in the Business Evolution Process Based on Organizational Ecology Jie Hou¹, Qiang Lu¹, Yongjiang Shi² ¹Harbin Institute of Technology, China ²University of Cambridge, United Kingdom
- p.85 A New Practical Conformance Testing Method Based on Standard Zhou Jiang¹, Li Zheng², Fujiang Liu³,

Zhou Jiang¹, Li Zheng², Fujiang Liu³, Qing Xiang²
¹Tsirghua University, China National Institute of Standardization, China
²Tsinghua University, China
³Zongdycyber Group Co. Ltd, China

Session	Decision Analysis & Methods (1)
Date	Wed, 7 Dec
Time	11:00 - 12:30
Room	Venus I
Chairs	Krzysztof Ostaszewski, Amir Elalouf

Profitability Analysis Using Data Envelopment Analysis-Discriminant Analysis: an Empirical Study Hung-Tso Lin¹, Yin-Chi Huang¹ ¹National Chin-Yi University of Technology, Taiwan

This paper addresses the profitability analysis of 31 chain stores belonging to a hairdressing company in central Taiwan. Four factors are adopted in the analysis with data of year 2010. The 31 stores are classified to four groups according to their levels of return on investment (ROI). The 31 stores are discriminated with apparent rate of 93.5% by a four-group data envelopment analysis-discriminant analysis (DEA-DA) model. The discriminant results reveal that two factors have positive effect for classifying a store to the group of high ROI level, while two factors have negative effect. This empirical study shows that DEA-DA is a suitable tool for the study company to discriminate the ROI attained in last year and can reveal the improvement aspects. Besides, the discriminant function obtained can be used to predict the ROI level of the oncoming year.

Comparison of Neural Network and Regression Techniques for Nonlinear Prediction Problems

Usha Anantha Kumar¹, Mukta Paliwal¹

¹Indian Institute of Technology Bombay, India

The aim of this study is to compare the predictive performance of feed forward neural network with some of the regression models that are capable of handling certain nonlinear prediction problems. Four real life examples are considered in this study where the response variable belongs to the exponential family of distributions and are modeled using generalized linear models. Results point out the merit of using appropriate regression models when the functional relationship between the variables is known apriori.

A Decision Analysis on Flexible Scale of Green Logistics under Limited Carbon Emission with Real Options Concept Tyrone T. Lin¹, Mong-Tien Chan¹

¹National Dong Hwa University, Taiwan

This paper aims at using quantified emission limitation as an important indicator when choosing the most optimal scale. Under the limitation of emission, transportation practitioners can buy the allowances from outside market or upgrade systems to conform the standard. In this paper, the related green investment cost and transportation price can be assessed, and the transportation service cost that originates from different scales is related to the expected transportation price. Under the above descriptions, this paper applies the real options approach to individually find out the project values of two stages and the most suitable timing to expand the scale. To conclude, the key issue of this paper is to help transportation practitioners to take balance between green economics and financial economics.

Integration Model of Fuzzy C Means Clustering Algorithm and TOPSIS Method for Customer Lifetime Value Assessment

Amir Hossein Azadnia¹, Muhamad Zameri Mat Saman¹, Kuan Yew Wong¹, Abdul Rahman Hemdi²

¹Universiti Teknologi Malaysia, Malaysia

²Universiti Teknologi Mara, Malaysia

Nowadays, companies should establish a long-term relationship with their customers throughout customer relationship management (CRM). In order to be a winner in the market competition, marketing managers want to maximize customer lifetime value (CLV) and customer equity. So, creating a customer value assessment system is obligatory for companies to identify customers' value, develop strategies for customers' segments, and preserve the high value for them. Commonly, customer lifetime value is evaluated by RFM (recency, frequency and monetary) method. In this paper a model for customer value assessment integrated with multi-criteria decision making method and Fuzzy clustering method based on customer purchasing behavior was proposed. Fuzzy Analytical Hierarchy Process was utilized to calculate the weight of RFM variables. Then, based on the weighted RFM values, Fuzzy c-means clustering was used in order to cluster customers. Finally, TOPSIS (Technique for Order Preference by Similarity to Ideal Solution) has been employed to rank customer lifetime value. A case study was used to demonstrate the employment of the proposed model.

A Modified Algorithm to Find a Representative Capacity with Evenness Consideration for Non-additive Robust Ordinal Regression

Roghayeh Hemmatjou¹, Nasim Nahavandi², Behzad Moshiri³, I. Nakhai¹

¹Tarbiat Modares University, Iran ²University of Tarbiat Modarres, Iran

³Tehran University. Iran

Non-additive robust ordinal regression (NAROR), uses primary preferences of decision maker (DM) to define the necessary preference relations (NPR) and possible preference relations (PPR) on alternatives when all compatible fuzzy measures are taken into account and aggregation function is Choquet integral (CI). The question arises as how these NPRs and PPRs can be used in capacity definition problem? This article proposes an algorithm which uses these relations in finding a capacity that is representative to DM and has also evenness property to some extent. The methods based on maximizing evenness leads to results that are not fully representative to DM, so this article improves this drawback by focusing on representativeness of capacity and taking into account capacity evenness by means of decision rules defined in algorithm.

Established the Evaluation Structure of the Investment Benefit of the "Doubling Tourist Arrivals Plan" in Taiwan Huey-hsi Lo1, Pei-cheng Wen2

¹Aletheia University, Taiwan ²Chung-Hua Institution for Economic Research, Taiwan

This study substantially established the evaluation structure of the investment benefit of the Doubling Tourist Arrivals Plan that was divided into five systems including policy planning, government input, international travelers market, domestic economic value and tourism industry development. In addition, the evaluation dimension and secondary dimension of various systems, evaluation indicators or content were set. In respect of the evaluation on the divisional plan and corresponding importance of goal achievement of the subsidiary plan, this research adopted the analytic hierarchy process and based on the requirement of the actual operation it was conducted in two stages. The execution measures of the Doubling Tourist Arrivals Plan and the goal connection strength indicators were established. Moreover, the analysis was conducted on the appropriateness of the resource deployment. Then the interview and investigation results were utilized to analyze the appropriateness of the planning and execution of the Doubling Tourist Arrivals Plan policy.

Session	Decision Analysis & Methods (2)
Date	Wed, 7 Dec
Time	13:30 - 15:00
Room	Venus I
Chairs	Yuya Kajikawa, Egon Mueller

Analyzing Newsvendor Problems by One-Shot Decision Approaches with Considering Regret

Peijun Guo¹, Yating Yang¹ ¹Yokohama National University, Japan

In this paper, a single-period inventory problem with partially known demand information characterized by possibility distributions is analyzed. Decision models are proposed based on one-shot decision approaches where three choices with considering regret of decision are provided. These three choices are used for determining which state of nature (demand) should be considered for each order quantity. Based on the selected states of nature (focus point), the optimal order quantity is obtained. Different kinds of focus points (demands) lead to different results (optimal order quantities) which reflecting a decision maker's attitudes about possibility of demand and regret of decision.

Simplification of Decision Making Matrix in Fuzzy Multiple Attribute Decision Making

Zhi Pei¹, Li Zheng² ¹Zhejiang University of Technology, China

²Tsinghua University, China

In the multiple attribute decision making, the computational intensity of problems quickly increases with the number of attributes increases. In this paper, we will introduce the simplification theory and technology of decision matrix in fuzzy multiple attribute decision making, and propose an attribute reduction algorithm. The purpose of this algorithm is to find all of the simplest order-preserving attribute subsets and the order-preserving attribute core of the corresponding multiple attribute decision making problem. One of the simplest orderpreserving attribute subsets will be exploited as a substitute of the original attribute set. Thus the original multiple attribute decision making problem could be simplified and unnecessary cost related to redundant attributes could be saved. Finally, an illustrative numerical example is given to demonstrate our approach. And through this example, a dissimilarity between the attribute reduction in decision making and the knowledge reduction in rough set theory is discovered.

A Petri Net Approach to Resource Allocation in Brand Management Systems

Hongwei Liao¹, Min Lu²

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Managing multiple brands within a single company is an increasingly important trend in the market. This trend complicates the brand management process. We propose a formal methodology to study resource allocation in brand management systems using Petri nets. Petri nets are a graphical modeling tool that is efficient in characterizing the concurrency of dynamic systems. We focus on an important class of brand conflict problems, known as deadlocks, which are caused by resource contention among brands. Marketing mix theory is employed to identify the resources that are critical to potential deadlocks. The brand management system is modeled as a Petri net, based on which we detect and prevent potential deadlocks via formal analysis. The proposed approach can also be used to verify the deadlock-freeness of a brand management system.

Optimal Determination of Simulated Annealing Parameters using TOPSIS Fateme Fotuhi¹

¹University of South Carolina, United States

Efficiency of a Meta heuristic approach depends effectively on the right and suitable choice of its parameters. Meta heuristics are used to develop qualified feasible solutions. They are used while common commercial soft wares can't find exact solutions in a logical computational time. They are random approaches as different target values might be gained during consecutive repetitions of the algorithm. An appropriate set of parameters avoids the problem to produce sporadic target values and controls the time to get coherent solutions. TOPSIS (Technique for Order Preference by Similarity to Ideal) is one of Multi Attribute Decision Making (MADM) approaches used in defining the best alternative in a complicated decision making problem which is used here to set the parameters of a simulated annealing algorithm in their suitable levels. This helps the algorithm to find good solutions besides controlling the time spent to get these values.

Merger and Acquisition Decisions Analysis with Sustainability Operation Concept

Tyrone T. Lin¹, Yi-Shun Huang¹ ¹National Dong Hwa University, Taiwan

Under the target of mergers & acquisitions (M&As), in addition to asking the traditional financial synergy of the maximization of shareholder wealth objectives, it is also necessary to think the social care and environmental commitment of social responsibility for the trend of sustainable operation. This paper mainly uses the mathematical model to evaluate how to decide M&As with the sustainability operation concept in the traditional financial economics. In order to conform to the aspects of sustainability operation and the economical concept of M&As about sustainability operation, this paper adopts the real options approach that estimates the reactions of Global 100 Passive Index to the M&As of corporate sustainability operation between before and after M&As. Therefore, the key point in this model is how to decide the appropriate timing of M&As, the threshold of the mathematical model, and the analysis of M&As of corporate sustainability operation between before and after M&As.

Simulation-Based Operational Decision Analysis at Decoupling Point in MTS-MTO System

Feng Yu Wang¹, Laura Xiao Xia Xu¹, Ronald Lim¹, E.W. Lee¹, Michal Zarzycki¹

¹Singapore Institute of Manufacturing Technology, Singapore

MTS-MTO system combines make-to-stock and make-to-order in a sequential manner and deliveries finished products in two steps. The combination system can lower the cost by taking advantage of economy of scale in MTS for standard semi-finished modules production, and satisfy high product variety by taking advantage of flexibility in MTO. But, its performance will drop when capacity is constrained. We deal with the operational problem by evaluating two joint operational decisions i.e. semi-finished module inventory policy and order admission control, in a simulation model. The numerical results suggest that both operational decisions have important influence on system performance and the impacts of the decision are interlinked. This paper extends current MTS-MTO system study from strategy focused to a new stage of concerning operational decisions.
Session	Decision Analysis & Methods (3)
Date	Wed, 7 Dec
Time	15:30 - 17:30
Room	Venus I
Chairs	Yves De Smet, Ching-Yu Lien

Applying Green Goodwill for Project Management on Green **Economics Concept**

Tyrone T. Lin¹, Wei-Cheng Wu¹

¹National Dong Hwa University, Taiwan The prosperous thinking of green environment has changed the

perceptions of companies to recognize the whole business operational environment, and how to the maximize stockholders' equity and satisfy the pubic expectation simultaneously is an important subject still waiting to be solved. This paper uses the real options approach to assess the project value reflected by the developing level of green goodwill; each firm engages in complying different levels of market demand, decides whether to invest in green capital, and evaluates the potential strategy value of entering timing to be a leader or follower in the market. This paper tries to start a preliminary analysis of green economy issues, which will help sequent researches to develop the related model and provide a reference of decision making in practice.

A Fuzzy-based Integrated Framework for Monitoring Stochastic Demand in a Supply Chain Environment

Henry Lau¹, Premaratne Samaranayake¹, Dilupa Nakandala¹

¹University of Western Sydney, Australia

This paper develops a Fuzzy-based Integrated Framework (FIF) that responds to the risk of fluctuating demand in a supply chain environment. It is a hybrid framework based on the fuzzy based stochastic demand model and the integrated processes of supply chain in enterprise resource planning (ERP) environment. This proposed FIF can be used to adjust the rate of change of demand based on fuzzy system reasoning, supported by real time inputs of the specific parameters and control data using integrated supply chain processes/models in ERP system environment. Based on a cost effective approach, this framework minimizes the total cost comprising inventory and stock-out costs. Using a case study, we validate the proposed integrated framework in actual industrial settings and discuss the practical importance for supply chain management in responding to uncertainties inherited in the operational environment.

A Multicriteria Decision Model for Managing Business Processes

Ana Carolina Campos¹, Adiel Almeida¹

¹Federal University of Pernambuco, Brazil

Nowadays companies recognize how important it is to manage their processes so as to increase their productivity and improve the quality of their products and operations. Managers play an important role in this context since they should monitor and improve the processes that are under their responsibility in order to create a competitive advantage for their company. However they do not have the time available to oversee all processes closely. This paper presents a management model based on Multicriteria Decision Aid (MCDA) concepts in order to help managers plan their activities throughout the week in order that they can dedicate themselves to the most critical processes.

Reducing Violence: A Proposal Based on Multicriteria SMARTS Method

Andre Gurgel¹, Caroline Mota¹, Dario Aloise²

¹Federal University of Pernambuco, Brazil ²Federal University of Rio Grande do Norte, Brazil

The use of different public policies for certain areas in the same region is a strategic issue for public safety management. Therefore, this article has developed a multicriteria model based on SMARTS method that prioritizes areas for a given region using demographic and socioeconomic issues. It used the "swing weights" procedure to elicit preferences for scale constants. This model was applied in Recife, where it was divided into human development units. The sensitivity analysis of scale constants helped to show that this model is robust, since there were few and not significant changes in the positioning of zones

Selection and Ranking of Improvement Approaches in Construction Companies: SMARTS Method Renata Maciel de Melo¹, Denise Medeiros¹, Adiel Almeida¹

¹Federal University of Pernambuco, Brazil

There are various ways, related to quality methods, tools and standards, to improve production processes. The aim of this paper is to present a multicriteria decision model for selecting and ranking these alternatives taking into account Quality, Environment and Sustainability, and Safety. The paper proposes a multicriteria decision model based in SMARTS (Simple Multi-attribute Rating Technique) method. A study case in the context of construction companies illustrates the use of the model. The definition of the criteria and their evaluation was conducted based on interviews with experts in construction companies. One of the differentials of this model is the structure designed for a quality program planning decision making. Also, it lays on its use of an alternative set of fragmented improvements. These alternatives were combined together with some restrictions so that they became a new global set of alternatives (macro alternatives).

Innovative Support of Creation by Analogy-based Searching of Potential Needs

Takayuki Suzuki¹, Taro Tezuka², Atsushi Aoyama¹, Fuminori Kimura¹, Akira Maeda1

¹Ritsumeikan University, Japan ²University of Tsukuba, Japan

The creation of innovative ideas is an essential part of business activities. However it is very difficult for many employees to come up with innovative ideas efficiently. This paper propose a system that supports users to create ideas by exploiting information available from online review sites based on the concept of Masakazu-Nakayama (NM) method, which is a well-known analogy based approach to creating new ideas. The key assumption is that the analogy between different product categories plays a central role in obtaining innovative ideas. Many famous inventions have actually resulted from transposing a technique or a concept used in one domain to another. The proposed system firstly calculates distances between product categories by their attributes using data obtained from review sites. The system then provides combinations of mutually similar product categories and the reasons for their similarities, so that users can utilize them as sources of new technological insights. We carried out experiments using real life data and found that the system successfully provides novel and useful analogies.

Insurance Pricing, Reinsurance and Investment Decision Based on the Mutual Benefit of the Insurer and the Customer Hong Mao¹, Krzysztof M. Ostaszewski²

¹Shanghai Second Polytechnic University, China

²Illinois State University, United States

In this article, we establish an optimal decision model of insurance pricing, reinsurance and investment based on the mutual benefits of the insurer and the customer instead of only considering the benefit of the insurer, which is conformed with one of important objective of financial institution, that is, customer-oriented. We assume that the price and the claim loss rate are independent stochastic processes and n kinds risky assets are correlated stochastic processes. The main objective of our model is to minimize the expected utility of the premium paid by the customer in a bounded horizon and to maximize the utility of the relative terminal wealth of the insurer respect to the price of insurance. We construct a HJB equation and determine the optimal price of the insurance products, the optimal reinsurance strategy and the optimal investment portfolio of the insurer simultaneously by solving Hamilton-Jacobobi-Bellman HJB equation. Finally, we use an example to illustrate its application.

Enhancing Tool Availability in the Forging Industry by Adjusting PPC and Tool Maintenance

Anis Selaouti', Sven Baumgarten¹, Jens-Michael Potthast¹, Rouven Nickel¹ ¹Institute of Integrated Production Hannover gGmbH, Germany

The day-to-day business of the forging industry is characterized by fluctuating order quantities and production of numerous variants. Within the framework of the Collaborative Research Centre (CRC) 489 "Process chain for the manufacturing of precision forged high performance components" a simulation based approach was developed for the implementation of operative tool management to reduce delays caused by the allocation of tools.

Session	Operations Research (1)
Date	Wed, 7 Dec
Time	11:00 - 12:30
Room	Venus II
Chairs	Mohamed K Omar, Arik Sadeh

Robust Optimization for Resource-constrained Project Scheduling with Uncertain Activity Durations

Roel Leus¹, Christian Artigues², Fabrice Talla Nobibon³ ¹Katholieke Universiteit Leuven, Belgium

²Research Institution, France ³HEC-Management School, University of Liege, Belgium

The purpose of this paper is to propose models for project scheduling when there is considerable uncertainty in the activity durations, to the extent that the decision maker cannot with confidence associate probabilities with the possible scenarios. Our modeling techniques stem from robust optimization, which is a theoretical framework that enables the decision maker to produce solutions that will have a reasonably good objective value under any likely input data scenario. We develop and implement a scenario-relaxation algorithm and a scenario-relaxation-based heuristic. The first algorithm produces optimal solutions but requires excessive running times even for medium-sized instances; the second algorithm produces high-quality solutions for medium-sized instances and outperforms two benchmark heuristics.

EPSO for Solving Non-oriented Two-dimensional Bin Packing Problem

Mohamed K. Omar¹, Kumaran Ramakrishnan² ¹Nottingham University Malaysia, Malaysia ²Multimedia University, Malaysia

The non-oriented two-dimensional bin packing problem is dealing with a set of rectangular pieces that need to be packed into identical rectangular bins. Moreover and in order to minimize the number of bins, the pieces are allowed to rotate by 90° without overlapping. There are many real life applications for this operations research problem. Among these applications: loading of boxes to pallets, trucks and containers, packing of box bases on shelves and other applications in the wood and metal industry. In this paper, we propose evolutionary particle swarm optimization algorithm (EPSO) for solving the non-oriented two-dimensional bin packing problem. Extensive numerical investigations are performed to determine the solution quality of the proposed algorithm. Moreover, the performance of our proposed algorithm is compared with a best known greedy algorithm published in the literature.

Equivalent Relationships of Problem Formulations Optimizing Forecast Accuracy

¹Sue-Ming Yuan¹, Wee Meng Yeo¹, Joyce M.W. Low² ¹Singapore Institute of Manufacturing Technology, Singapore

²Korea Aerospace University, South Korea

This paper discusses the relationships among the optimization problem formulations which optimize the forecasting accuracy indices, MAPE, MAD and RMSE, respectively. The paper proposes the base optimization problem formulation that is equivalent to all the optimization formulations based on the forecasting accuracy indices, MAPE, MAD and RMSE. The findings of this paper ensure these different optimization problem formulations can be unified by defining the base optimization problem. Through three industry cases, the applications of the results are discussed.

Multi-heuristics Based Genetic Algorithm for Solving Maritime Inventory Routing Problem Nurhadi Siswanto¹, Daryl Essam¹, Ruhul Sarker¹

¹University of New South Wales, Australia

This paper discusses a multi-heuristics based Genetic Algorithm (GA) to solve maritime inventory routing problems (mIRP). The problem is to transport multiple oil products from a production facility to some consumption ports by using several heterogeneous ships with undedicated compartments. The objective of the problem is to find a minimum cost solution, while satisfying a number of technical and physical constraints, within a given planning horizon. The strategies to assign a ship are transformed to a set of heuristic combinations represented by a chromosome. At every iteration a number of chromosomes are evaluated and evolved within a GA framework. The approach has been applied on several test cases. The multi-heuristic results show that the best optimum values of the case problems are not different from the ones from a MILP method solved using Lingo, but they do so with a significant decrease in computation time.

A Heuristic Algorithm for Substrates Testing in MCM

Keisuke Murakami ¹National Institute of Informatics, Japan

Multi-chip module (MCM) substrate is designed to pack two or more semiconductor chips. On a MCM substrate, there might exist a few types of faults in the wiring. Thus, it is essential to establish an efficient method for testing in MCM to detect faults. This paper presents a heuristic algorithm for substrates testing in MCM. Our objective is to minimize the completion time of the testing. The testing is performed by two equipments, called probe. Several previous works propose a method for the testing. Although the method finds at least one feasible solution fast, there is no guarantee that the solution is always good. Therefore, we formulate a testing problem as a shortest path problem with covering constraints (SPCC) and then, we propose a heuristic algorithm for the SPCC. In computation experiments, we show the SPCC approach are superior to the existing method.

Nash Equilibruim Retail Prices in a Linear Duopoly Market

Tomoki Hamaguchi¹, Koichi Nakade¹ ¹Nagoya Institute of Technology, Japan

In this study Nash equilibrium retail prices in a linear duopoly market are analyzed. It is found that the simple model, in which consumers buy items less than the critical price and do not buy otherwise, has theoretical problems and may have no equilibrium prices. The modified market model, which has two-stage critical prices, is proposed and the demand functions on retail prices are analyzed. This demand model is applied to a supply chain model with one supplier and two retailers.

Cross Docking Scheduling with Delivery Time Window and **Temporary Storage**

Dwi Agustina¹, Carman Ka Man Lee¹, Rajesh Piplani¹

¹Nanyang Technological University, Singapore

The cross docking is an innovative distribution strategy for transshipment of time-sensitive products. In this research we develop a model for scheduling of a cross docking warehouse with focus on delivery time window. The objective of the model is to minimize the cost of distribution, including earliness and tardiness costs, and inventory holding cost. The problem is formulated as a mixed integer program. Using LINGO 12.0 it is found that our proposed method can calculate the total cost with short computation time.

Session	Operations Research (2)
Date	Wed, 7 Dec
Time	13:30 - 15:00
Room	Venus II
Chairs	Romeo Marian, Noor Hasnah Moin

A Stochastic Formulation of Successive Software Releases with Faults Severity

Ompal Singh¹, Pramod Kumar Kapur¹, Adarsh Anand¹

¹University of Delhi, India Software companies are coming with multiple add-ons to survive in the pure competitive environment. Each succeeding up-gradation offers some performance enhancement and distinguishing itself from the past release. If the size of the software system is large, the number of faults detected during the testing phase becomes large, and the number of faults, which are removed through each debugging, becomes small compared to initial fault content at the beginning of the testing phase. In such a situation, we can model the software fault

detection process as a stochastic process with continuous state space. In this paper, we propose a multi-release software reliability growth model based on Ito 's type of differential equation. The model categorizes Faults in two categories: simple and hard with respect to time which they take for isolation and removal after their observation. The model developed is validated on real data set.

Capacitated Hub Location Problems with Waiting Time at Hubs

Arsham Atashi¹, Mostafa Abedzadeh¹

¹K. N. Toosi University of Technology, Iran

A new subject in the scope of capacitated hub location problems is presented. In most of postal networks or data and airline networks, hubs are special facilities that act as consolidation, sorting and distribution centers of flow. Since the models dealing with these problems focus on economic benefits with respect to costs of routing and opening hubs, there may be congestion of passing flow at some hubs. We concentrate on postal networks and consider every hub as M/M/1 queueing system to restrict mean time spent by unit of flow at hubs. Models including capacity constraints are derived for both single and multiple allocation types, and the CSAHLP model is tested on a data set available in the literature by GAMS to analyze the computational results.

Evaluation on Operation Management of Cascade Hydropower Stations

Y. Zheng¹, X.D. Fu², Jia Hua Wei², Xiang Li² ¹Tsinghua University, Three Gorges University, China ²Tsinghua University, China

An evaluation framework for joint operation of cascade hydropower stations was developed in this study. This framework is helpful to evaluate the operation performance of the cascade hydropower stations in order to improve the operation level. The power benefit of the cascade hydropower stations is chosen to be the evaluation object for multipurpose reservoirs and other targets are described as constraints according to the mandatory operation policy. The power generation is maximized by means of an optimal algorithm which is linked to a joint operation simulation model. This theoretical maximum power generation is introduced as an evaluative criterion to assess the indicated additional benefits compared with actual hydropower generation. In addition, an analysis module is involved to assess the influence of various factors on the operation performance. The developed framework was verified by the joint operation of the Three Gorges Project and Gezhouba cascade hydropower stations.

A Review of Data Envelopment Analysis Models for Handling Data Variations Chuen Tse Kuah¹, Kuan Yew Wong¹

¹Universiti Teknologi Malaysia, Malaysia

Conventional data envelopment analysis (DEA) models require that the inputs and outputs to be measured deterministically. However, in real world applications, the measurements are subjected to random noise and errors. Ignoring the randomness in the measurement would render an evaluation using DEA unreliable. In response to this particular weakness of DEA, a number of DEA models have been proposed in the literature. This paper's aim is to review the major DEA models for handling data variations. The models include Stochastic DEA (SDEA), Fuzzy DEA (FDEA), and Imprecise DEA (IDEA). Some future research directions in this area will be highlighted as well.

Order Batching and Picking in a Synchronized Zone Order Picking System

Li Pan¹, Joshua Zhexue Huang², Sydney C. K. Chu¹

¹The University of Hong Kong, China

²Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, China Order picking has been considered as one of the most critical operations in warehouse. In this study, we propose an analytical approximation model based on probability and queueing network theory to analyze order batching and picking area zoning on the mean order throughput time in a synchronized zone picker-to-part order picking system. The resulting model can be easily applied in the design and selection process of order picking systems.

Evacuation Route Scheduling Using Discrete Time-Based Capacity-Constrained Model

Mojahid F. Saeed Osman¹, Bala Ram² ¹King Fahd University of Petroleum and Minerals, Saudi Arabia ²North Carolina A&T State University, United States

This paper addresses the problem of modeling evacuation scheduling out of an affected area. There are a pre-defined set of exit points out of the target affected area and a set of source points for the evacuees. We propose an optimization model for evacuation scheduling; this approach models the capacity-constrained evacuation scheduling problem over discrete time as an integer optimization model. A recent efficient heuristic for evacuation planning, Capacity-Constrained Route Planning (CCRP) algorithm is selected as a reference for comparison. The result on a sample problem shows that the proposed model is competitive with the CCRP heuristic in terms of the resulting evacuation time and evacuation routes and schedules.

Session	Operations Research (3)
Date	Wed, 7 Dec
Time	15:30 - 17:30
Room	Venus II
Chairs	Xue-Ming Yuan, Mojahid Saeed Osman

A Hospital Admission Planning Model for Emergency and **Elective Patients Under Stochastic Resource Requirements** and No-shows

Phongchai Jittamai¹, Thirapan Kangwansura¹

¹Suranaree University of Technology, Thailand

Hospital admission planning plays an important role for managing and allocating hospital resources by emphasizing on an optimal use of operating theater time. The objective of this work is to develop a mixed integer linear programming model in order to minimize the total absolute deviations of the operating room resource utilizations from their target utilizations for the multiple-day planning horizon. The stochastic resource requirements such as length of stay, emergency arrivals, and unattended patients (no-shows) are considered in the proposed formulation. The mathematical model was tested with a sample data set. Results show that the deviations from the target resource utilizations are decreased by 0%, 3.18%, 0.45%, and 3.00% for each type of hospital resources; namely, operating theater time, intensive-care beds, intensive-care nursing staff and medium-care beds, respectively. Moreover, the gap deviated from the overall target resource utilization is improved by 1%.

Multi-processor Job Shop Scheduling with Due Windows

Rong-Hwa Huang¹, Shun-Chi Yu¹

¹Fu Jen Catholic University, Taiwan

Job shop is one of the most popular manufacturing environments in practice and is extensively discussed in literatures. Most of the literatures focus on one machine setup at each shop, which usually does not happen in practice for the purpose of workload balancing and make-span shortening. Therefore, this study aims to minimize total earliness and tardiness costs of a multi-processor job shop scheduling problem with due windows. Ant colony optimization (ACO) is deployed to solve the problem. Simulation data testing results show that ACO has similar solutions to integer programming in small scale problems, and robust, effective and time-efficient solutions in large scale problems.

Spreadsheet Approach for Solving Complex Flowshop Scheduling Problems

Mohamed K. Omar¹ ¹Nottingham University Malaysia, Malaysia

Méndez et al., [1] proposed an elegant MILP that provides a solution to a complicated short-term scheduling of resource-constraint multistage flowshop batch facilities. Moreover, the work presents a three-variation of the problem and provides a solution for each variation. In recent years, many metaheuristics are developed to work as add-in to spreadsheet popular software to provide solutions for optimization problems. This paper reports on an application of spreadsheet based Genetic Algorithm (GA) to solve the problem reported by Méndez. Moreover, our results indicate that it is possible to solve complex scheduling problems using the proposed approach, however, spreadsheet formulation knowledge and modelling skills are required.

A Pseudo-efficient Frontier Method for Solving Two-Phase Packing Problems

David Raz¹, Arik Sadeh¹

¹Holon Institute of Technology, Israel

Packing problems are very common and popular but typical solution procedures involve computation of numerous feasible solutions even for a small scale problem. These types of problems are commonly categorized as knapsack problem or bin packing problems and many of them are NP complete. An efficient mechanism for finding an exact solution for a two phase packing problem is proposed. The mechanism reduces the number of feasible solutions considered by conducting a na"ive search for a pseudo efficient frontier of solutions for the first phase. Furthermore, by conduction the first phase in such a way, evaluating the second phase is made more efficient. An algorithm for the two dimensional case is presented along with proofs of correctness and complexity.

Moral Hazard Resolved in Communication for S4n-Logic -Acyclic Communication Network Case -Takashi Matsuhisa

Ibaraki National College of Technology, Japan

This paper investigates the role of communication among the principal and agents under uncertainty. We treat the problem: How epistemic conditions of communication will be able to settle a moral hazard in team in the principal-agent model under uncertainty. We shall propose a communication process to resolve the moral hazard in the principal-agent model by communication. We assume that the agents have the knowledge structure induced from a binary relation associated with the multi-modal logic bf S4n. We show that the moral hazard can be resolved if the principal and each agent communicate their expected marginal costs according to the acyclic communication graph.

Optimization of Multi Periods Inventory Routing Problem Model with Time Varying Demand

Noor Hasnah Moin¹ ¹University of Malaya, Malaysia

In this paper we consider a multi period Inventory Routing Problem (IRP) that faces time varying demand of multi product from the assembly plant. The problem addressed in this study is a many-to-one distribution network consisting of an assembly plant and man y geographically dispersed suppliers where each supplier supplies distinct product to the assembly plant. It is based on a finite horizon, multi-periods, multi-suppliers and multi-products where a fleet of capacitated homogeneous vehicles, housed at a depot, transport parts from the suppliers to meet the demand specified by the assembly plant in each period. We propose a solution method based on the Variable Neighborhood Search. The algorithm incorporates the Generalised Insertion (GENI) method and the algorithm are run on several problems from the literature and the results are compared with the Genetic Algorithms. VNS performs better on larger problems.

A Math-heuristic Approach for Integrated Resource Scheduling in a Maritime Logistics Facility

Hua Xing Chen¹, Hoong Chuin Lau¹ ¹Singapore Management University, Singapore

This paper addresses a real-world integrated logistics problem involving the servicing of vessels in a maritime logistics facility. It can be modeled as a job shop problem in which the operations of a job require not only a single machine, but also a set of equipment to be processed plus a large number of side constraints. We decompose the problem into a machine scheduling problem and an equipment allocation problem. The former sub-problem is solved heuristically that prune the solution space for the latter equipment allocation problem, which is solved by an exact mathematical model. We run this math-heuristic approach on a set of real industrial test cases and benchmark the results against a conventional heuristic approach.

A Tabu Search Algorithm for Integrated Inventory and Vehicle Routing Problem in One Depot and Multicustomers **Distribution System**

Anchalee Supithak

¹Thai-Nichi Institute of Technology, Thailand

This research aims to solve Inventory Routing Problem (IRP) by developing two-phase heuristic based on EOQ with power-of-two policy, saving algorithm and tabu search method. The first phase intends to minimize inventory cost while the second phase proposes to minimize transportation cost. We construct fitness function composing of minimizing travelling distance and maximizing vehicle capacity utilization with weighted decision variables. The algorithm mechanism is swapping and applies tabu search to find the optimal solution from possible neighborhood solutions. The effectiveness of developed algorithm is evaluated by comparing the best solution to the initial solution using fitness deviation. The results show that fitness deviation is improved about 22.66% comparing to the fitness value of the initial solution. We perform analysis of variance with randomly generated problems to analyze sensitivity of two factors, number of retailers and setup cost to holding cost ratio. The results show no significant difference of both factors on fitness deviation values at 0.05 significant level.

Session	Supply Chain Management (1)
Date	Wed, 7 Dec
Time	11:00 - 12:30
Room	Jupiter I
Chairs	Niak Wu Koh, Md. Mamun Habib

Effective Design of the Construction Supply Chain: A Case of Small Buildings in Thailand

Sataporn Amornsawadwatana¹ ¹University of the Thai Chamber of Commerce, Thailand

Effective management of the construction project can be achieved by implementing the supply chain management approach. Upstream and downstream construction activities are collaborately conducted. Logistics activities must be considered during the design phase. Information sharing among designers, suppliers, construction engineers, distributors, and project managers are key aspects in using just-in-time (JIT) approach in construction supply chain. Consequently, performance of projects can be improved e.g. less material handling and storage activities can reduce costs. Simulation is used to model and measure the performance of construction supply chain. Finally, the actual building construction case is studied and validated. Objectives of research are (i) to identify critical factors in the construction supply chain, (ii) to reduce logistics cost in the building construction project, and (iii) to implement the supply chain management in the actual construction project.

Simply Structured Policies for a Dynamic Pricing Problem with Constant Price Elasticity Demand

Chia-Shin Chung¹, James Flynn¹ ¹Cleveland State University, United States

Consider a retailer, stocking a seasonal item facing a stochastic demand. The retailer places orders before the start of the season and in-season reorders are impossible. A question frequently asked is: How should one set prices throughout the selling season to optimize profits? Applications include the production of fashion goods, hotel rooms, airline seats, and car rentals. The objective function is typically non-concave, so finding an optimal solution is computationally challenging and heuristic approaches are often employed. For a T period dynamic pricing model with the expected profit objective, it was shown in the literature that the problem reduces to solving T single variable optimization problems. We extend the result by incorporating holding costs. We obtain similar simple solutions for the special cases of deterministic demands and nonnegative holding costs proportional to selling prices. For the general case, we introduce heuristics using simply structured policies.

Governance Mode in Reverse Logistics: a Research Framework

Qing Lu¹, Mark Goh¹, Robert De Souza¹

¹National University of Singapore, Singapore As the reverse supply chain for sustainability reasons has been attracting increasing attention, this theoretical work focuses on the governance mode of reverse logistics. It is a less explored sub-field in the reverse supply chain literature where manufacturers, distributors, and retailers have important roles in the chain governance. Manufacturers often engage professional third-party logistics (3PLs) firms to manage their products due to the complexity, variety, and trade compliance of such products. While such engagement can reduce the burden of product management for the manufacturers, the potential loss of competitive advantage or a conflict of interest can affect the manufacturers' reputation and profitability. Based on the literature as well as our initial fieldwork in several industries, we develop a research framework to explore the governance choice of manufacturers for reverse logistics, and examine the factors affecting the preference between self-governance and the outsourcing to third parties such as the 3PLs.

Developing an Improved Particle Swarm Optimization Algorithm for Solving the Inventory Routing Problem with Direct Shipment

I. Nakhai¹, Seyed Hessameddin Zegordi¹, Ali Hossein Mirzaei¹ ¹Tarbiat Modares University, Iran

This paper considers a multi-period multi-product inventory routing problem whereas the objective is to minimize total system cost that includes production setup, inventory and distribution costs. The problem integrates decisions on the production planning, inventory management and distribution planning. Here, we assume that products are produced and delivered from one manufacturer to a set of retailers through a fleet of homogenous capacitated vehicles under direct shipping strategy. Since the problem is known as an NP-hard problem, this paper proposes an improved particle swarm optimization algorithm for solving the problem. The efficiency and the reliability of the proposed algorithm are evaluated by using various test problems with different sizes that is randomly generated. The performance of the developed algorithm is compared with two different algorithms: Particle Swarm Optimization, and Genetic Algorithm. The numerical results show that the developed algorithm outperforms benchmark algorithms, especially for the large-sized problems.

Risks Assessment of Lower Tier Suppliers Using Operational Reliabilities and Product Availabilities

Gopal Agarwal¹, Piyush Singhal², Murari LaiMittal¹ ¹Malaviya National Institute of Technology Jaipur, India ²GLA University, India

The recent disturbing events across the globe such as climatologic disasters, epidemics, political instability, terrorism and financial scams have emanated the potential risks to global supply chains practices. Apart this the inclination towards the efficient strategies like lean practices, lower inventories, outsourcing and single sourcing are also making the supply chains vulnerable to dependency risks. Supply chains can be disrupted at supply side, customer side or at the focal firm locations during the processing, but the associated criticality is that the severity of the risks propagates through supply chains and deteriorates the performance of not only the one firm but the entire network. This paper examines risks to the supply side primarily focusing on lower tier suppliers which are usually the small medium enterprises. In this study elements of system reliability and product availability are estimated with the infrastructural risks of lower tier suppliers to develop a combined risk assessment index under demand and supply uncertainties. This approach can further be enhanced to rank suppliers and to assess overall supply chain performance.

EOQ Model Development for Perishable Items under Stock Dependent Demand and Time Dependent Partial Backlogging by Using Intelligent Packaging

Narges Khanlarzade¹, I. Nakhai¹, B. Yousefi²

¹Tarbiat Modares University, Iran ²Islamic Azad University, Iran

In 2006, Chang et al. developed the EOQ model of Dye and Ouyang for perishable items. In this paper we develop their model by adding parameters of intelligent packaging. Our developed model shows, in spite of its costs, that intelligent packaging can increase the profit. The existence and uniqueness of the optimal solution of the model is examined, subsequently numerical examples are presented to illustrate the application of developed model.

A Study on Lean Supply Chain Performance Measures of SMEs in the Automotive Industry

Farzad Behrouzi¹, Kuan Yew Wong¹, Farshad Behrouzi¹

¹Universiti Teknologi Malaysia, Malaysia

This paper aims to investigate the concept of lean supply chain, and develop a list of performance measures for manufacturing small and medium size enterprises (SMEs) in the automotive industry. A total number of 28 performance measures were identified to represent the leanness of supply chain. Data were collected from 133 supply chain practitioners working at manufacturing SMEs in Iran's automotive industry. Lean supply chain performance was divided into four components (attributes), i.e. waste elimination, continuous improvement, just-in-time (JIT), and flexibility. Delivery & reliability (D&R) was selected as a representative for JIT. Flexibility was directly connected to the measures without any division. This study gives a real insight into the lean supply chain performance measures, and contributes to expand the knowledge in this area. The lean performance attributes and related measures can also be used as inputs for a lean supply chain performance measurement system.

Session	Supply Chain Management (2)
Date	Wed, 7 Dec
Time	13:30 - 15:00
Room	Jupiter I
Chairs	Weidong Lin, Virgilio Cruz-Machado

An Exploratory Research on Educational Supply Chain Management

Md. Mamun Habib¹, Veena Tewari², VVR Raman³

¹American International University-Bangladesh (AIUB), Bangladesh ²Asia Pacific Institute of Management, India

³Asmara College of Health Sciences, South Africa

The exploratory study investigates the education supply chain and the research supply chain as major constituents in the educational supply chain management for the universities. Its applicability was successfully verified and validated through survey data from leading universities around the world. Model constructs were identified and confirmed by 493 respondents, representing experts and administrators, faculty, staffs of the university, employers, graduates, etc. The resulting model was subsequently evaluated for accuracy and validity by multiple linear regression (MLR) analysis and the structural equation modeling (SEM) technique. This model furnishes stakeholders of the supply chain with appropriate strategies to review and appraise their performance toward fulfillment of ultimate goals, i.e. producing high-caliber graduates and high-impact research outcomes, which represent two main contributions, for the betterment of the end customer, i.e., the society.

Production and Distribution Planning Model for Hinterland Supply Chain

Shi Tao Zhao¹, Xue-Ming Yuan², Shih Fu Ling¹ Nanyang Technological University, Singapore

²Singapore Institute of Manufacturing Technology, Singapore

The overall focus of this research is to address a supply, manufacturing, shipping and distribution problem faced by a company that manages a hinterland supply chain to meet customers' annual independent demand. The problem involves the delivery of products from raw materials purchasing to delivery of the finish goods to destination distribution centres. Since the annual products independent demanded by customers are fixed, the manufacturing and shipment planning are of great economic importance. This problem is formulated as a mathematical model. The objective function seeks to minimize the total cost including the purchasing, manufacturing, transportation and inventory costs. When this model is resolved, the interval period of incoming raw materials delivery can be determined at the minimal total cost. Some results are discussed under special circumstances.

The Application of Vendor Managed Inventory in the Supply Chain Inventory Model with Probabilistic Demand Yosi Agustina Hidayat¹, Ika Deefi Anna², Arlene Khrisnadewi¹

Yosi Agustina Hidayati, ika Deen Anna, Sheric Kuraawa ... ¹Bandung Institute of Technology, Indonesia ²Bandung Institute of Technology, University of Trunojoyo, Indonesia Numerous studies show that the application of Vendor Managed Inventory (VMI) provides benefits for members of the supply chain. This research considers the application of VMI in a supplier-buyer relationship and develops an analytical model to prove the benefits obtained from the VMI collaborative initiatives. A mathematical model is developed for a two-level supply chain consists of single supplier and single buyer in a probabilistic demand situation. The analytical model shows that the VMI implementation in the probabilistic inventory model, considering leadtime as a decision variable, has the ability to reduce the supply chain expected total cost, reduce the leadtime, therefore increase the frequency of replenishment and improve the service level. Numerical examples are given to prove these results analytically.

A Logistics Execution Method for the Regional Distribution Center

Yuan-Kuei Huang¹, Wei-Jun Lu², Jun-Der Leu² ¹Deloitte & Touche Consulting Co., Taiwan ²National Central University, Taiwan

Regional distribution center of logistics system provides the service of assembling, packaging and shipping products to customers. The center has to minimize the product inventory, in-transit materials, and components meet the dynamic demands according to the market changes. So, for the regional distribution centers in market-oriented enterprises, an efficient distribution operation plan method is needed desperately. However, there are fewer literatures about the feature development method of a regional distribution center dealing with sales and distribution planning models. Therefore, this study takes maximizing customer satisfaction as the point of view with consideration of time urgency and product value of the delivery coordinated with regional distribution center distribution planning method. Finally, the empirical case studies are applied to illustrate and validate this method deciding the distribution route and compare the performance difference on the planning result by two different core formulas.

Research on Measuring Method of Supply Chain Resilience Based on Biological Cell Elasticity Theory

Ying Shuai¹, Xinping Wang¹, Lindu Zhao ¹Southeast University, China

In supply chain management, it is easy to make the supply chain system vulnerable, lack of resilience and even disorderly if we simply emphasize lower costs and higher efficiency. The subject on how to strengthen the resilience of supply chain has attracted more and more scholars' attention. However, relevant studies are mostly concentrated on qualitative analysis. In this paper, a quantitative measuring method, referring to stress relaxation time of material mechanics, was proposed based on the biological cell elasticity theory, which is helpful to the research of supply chain resilience in quantitative approach. Then the impact of different factors on supply chain resilience was discussed. The results are consistent with the realistic situation and indicate that the measuring model is reasonable and right under the assumed conditions

Critical Success Factors of Total Productive Maintenance Implementation: A Review

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²Multimedia University, Malaysia

³Monash University Sunway, Malaysia

The maintenance function has gone through many changes over the past few decades. The very traditional perception of maintenance's role is to get into action whenever a breakdown occurs. Total productive maintenance therefore shifts the paradigm of company's traditional maintenance system from being reactive to being more proactive by maintaining the equipment in optimum condition at all times. The main findings of this research are that the critical success of TPM implementation such as commitment from top management, cultural change, education and training, clear vision and mission, effective communication, language problems and measurable definition for TPM were identified.

Session	Supply Chain Management (3)
Date	Wed, 7 Dec
Time	15:30 - 17:30
Room	Jupiter I
Chairs	Songlin Chen, Maria Grazia Gnoni

Designing the Optimal Strategies for Supply Chain Financing under Warehouse Receipt Pledging with Credit Line

Nina Yan¹, Tian Tian¹

Central University of Finance and Economics, China

The optimal strategy of financing through warehouse receipt pledging for retailers with capital constraints in the supply chain financing system under demand uncertainties is designed and investigated. We design a supply chain financing system composed of the manufacturer, the retailer and the commercial bank, in which the credit line and bankruptcy probability of the retailer are considered. The optimized financing interest rate for the commercial bank, the optimized order policy for the retailer and the optimized wholesale price for the poincy for the retailer and the optimized wholesale price for the manufacturer are analyzed respectively, and the comparison analysis about the optimal strategy for the financing strategy with and without credit line are proposed. It concluded that the financing strategy with limited credit line can stimulate the increase in order quantity inside the supply chain financing system and can provide the effective financing motivation for the risky retailer. Finally, we use the numerical study to analyze the influence of retailers with different lines of credit and the supply chain financing system and can provide the effective financing motivation for the risky retailer. on the optimal strategy in supply chain financing system, thus verify the result of theoretical analysis.

A Framework for Integrated Assessment of Sustainable Supply Chain Management

Farzad Dehghanian¹, Saeed Mansoor², Mahboobeh Nazari² ¹Ferdowsi University of Mashhad, Iran

²Amirkabir University of Technology, Iran

This paper presents a framework for calculating an integrated index to assess the sustainability of the supply chain of a given product. Analytical Hierarchy Process (AHP) has been used to obtain relative weights of the different indicators and dimensions of sustainable development context. This framework considers all entities involved in the supply chain and provides an integrated index to evaluate supply chain movement towards a more sustainable environment. Plastic carrier bags supplied by a large supermarket chain, Shahrvand, is chosen as a case study. An integrated index of sustainability is presented for plastic carrier bags supply chain in two periods of time. Interpretation and sensitivity analysis of results is given and effectiveness of integrated index is pointed out.

A Multiobjective Evolutionary Approach for Integration of Location-Inventory and Vendor Selection Decisions Chia-Lin Hsieh¹

¹Aletheia University, Taiwan

In this research, we examined an integrated location-inventory and vendor selection problem, including conflicting objectives (e.g. efficiency and responsiveness). The goal here is the simultaneous determination of (i) the set of vendors the firm should work with; (ii) the number and the locations of distribution centers (DCs) or warehouses and also the assignment of retailers to DCs and (iii) how much each retailer should order from the selected vendors. The model is a challenging mixed integer on linear program for which we propose an efficient solution approach that relies on a hybrid multiobjective evolutionary algorithm to provide an efficient facility location portfolio, and permits a comprehensive trade-off evaluation between the "quality" of the set of elite solutions and the time and memory required to produce them. Computational results demonstrating the performance of the proposed heuristic methods and the potential practical impact of integrated decision making for location-inventory and vendor selection decisions are reported.

Selection of Distribution Centers with the Time Value of Money and the Loyal Customer Effect

Alireza Amini¹, Reza Tavakkoli-Moghaddam¹, Armand Baboli² ¹University of Tehran, Iran

²Universite de Lyon, France

This paper addresses a distribution center selection problem in a three-echelon supply chain including suppliers, distribution centers (DCs) and retailers. There is a set of DCs, in which some of them should be selected in each period. Due to the imperative role of the time value of money (TVM), we consider this decisive factor in the problem. Besides it is assumed that the setup cost of each DC can be decreased in period t based on its number of the previous periods that it has been selected. This period set of the provides periods black of the problem is to minimize the total costs, including transportation and setup costs. A non-linear mathematical model is developed for the mentioned problem and it has been solved by the GAMS optimization software to obtain the optimum set of DCs.

Coffee Waste Management. A Case Study

Virginia Machado¹, Ana Paula Barroso¹, Carolina Santos¹, Virgilio Cruz Machado¹

¹Universidade Nova de Lisboa, Portugal

For some years now, organizations and countries have been concerned with waste management. This has resulted in laws that held producers responsible for the recovery of the products that they produce when these reach the end of their lifetime. Although the existing legislation does not include all types of wastes, some producers have been making efforts in adapting the supply chain management to the activities associated with recovering waste produced by the products that they associated with recovering waste produced by the products that they are responsible for because they feel socially motivated to give an ecological image and/or they want to prepare for the legislation implementation that they foresee is going to be published. The case study presented here is a pilot study supporting the decision developed in an organization responsible for roasting and distributing coffee in Portugal with the objective of achieving a model of coffee unstreaduction and transmitted that is efficient to advance the waste collection and transportation that is efficient and reduces the environmental impact.

A Buffer Stock Model to Ensure Price Stabilization and Availability of Seasonal Staple Food by Empowering Producer Using Warehouse Receipt System Wahyudi Sutopo¹, Senator Nur Bahagia², Andi Cakravastia², T.M.A.

Arisamadhi²

¹Bandung Institute of Technology, Sebelas Maret University, Indonesia

Staple food that is produced by agro industry has salient supply disparity during the harvest and planting season. This situation could cause both staple food scarcity and price fluctuation. An indirect market intervention model is proposed to mitigate producer's revenue loss when selling price plunges and to secure consumer's need when staple food is scarce. The model uses buffer stock scheme in accordance with warehouse receipt system (WRS) and collateral management system. By using WRS, producer can pawn some of their staple food to the warehouse management and obtain receipt, then give the receipt to the Financial Institutions to access loan. Next, they can redeem their pawn and sell them under profitable price. Mixed-integer nonlinear programming (MINLP) approach has been used to determine the decision variables for producer and government. The result shows that the model can be used to solve problem.

Conceptual Model for Information Systems of Sustainable Supply Chain Management

Majid Aarabi¹, Muhamad Zameri Mat Saman¹, Mohammad Reza Khoei¹, Kuan Yew Wong¹, Hooshang M. Beheshti², Norhayati Zakuan¹ ¹Universiti Teknologi Malaysia, Malaysia

 $^{2}Radford$ University, United States New challenges and opportunities are encountered in the present supply chain management. In addition to the competition of the markets in the globe, limitation of energy, raw and virgin materials, environmental protection crisis and increase of global population are causing unprecedented issues to the worldwide supply chains for obtaining of goods and services for customers efficiently and effectively. Conventional supply chain management (SCM) considered three stages: pre-manufacture, manufacture and use, while the present enterprises need to consider the sustainable supply chain management (SSCM) for competitiveness and stability in the market. SSCM stages are: pre-manufacture, manufacture, use and post-use. Sustainable enterprises, also promote three core aspects: Environmental, Economical and Social. In this paper, it discusses the 6Rs of sustainable manufacturing in SSCM with regard to the three core aspects. A conceptual model is proposed for sustainable supply chain management information systems and this model is demonstrated in a case study.

Using an Artificial Neural Network and a Mathematical Model for Sugarcane Harvesting Scheduling Surached Thuankaewsing¹, Supachai Pathumnakul¹, Kullapapruk

Piewthongngam¹

¹Khon Kaen University, Thailand

In this paper, the sugarcane harvesting scheduling problem, in the northeast region of Thailand, is addressed. Since there are many small northeast region of Thalland, is addressed. Since there are many small size farmers are participated as suppliers of the sugarcane mill, a harvesting schedule, which could provide the maximum production yield for sugarcane mill and also equal opportunity for farmers to harvest at their suitable time are required. A model, which is the combination of an artificial neural network (ANN) and a mathematical model, is proposed to solve the problem. The ANN is used to forecast nodel, is proposed to solve the problem. The ANN is used to forecast sugarcane yield of each plantation over harvesting season. Then, the forecasted values are used by the mathematical model to find the optimal harvesting schedule. The objective function of the proposed mathematical model is to maximize the total sugarcane yield; meanwhile the harvesting scheduling maintains the equality among farmers in the group. The application of the model is also investigated with an example problem.

Session	Production Planning & Control (1)
Date	Wed, 7 Dec
Time	11:00 - 12:30
Room	Jupiter II
Chairs	Suksan Prombanpong, Fazleena Badurdeen

Optimum Quantities of Make and Buy in Multi-Item Manufacturing Firms with Restriction in Production Capacity

Mohammadal A. Pirayesh Neghab¹, Saeed Poormoaied¹

¹Ferdowsi University of Mashhad, Iran

Sometimes, some companies with consideration to their production capacity cannot respond to their demand. If demand increases and company doesn't have sufficient capacity to respond to such demand, it will encounter backlogging. Also, in a multi-item company, if the number of products increases, the company may not be able to produce some products, thus backlogging will be occurred. In this paper, we consider such companies that will encounter the mentioned conditions and will be enforced to buy some products from outside. The aim of this paper is determination of optimum quantities of make and buy for each product to minimize total inventory cost. We refer to the proposed model as make-with-buy model. In this paper we formulate the make-with-buy model and solve it by genetic algorithm through Matlab software.

Study and Application of Scheduling Method for Just-in-time Production in Flexible Job Shops

Wei Weng¹, Shigeru Fujimura¹

¹Waseda University, Japan

The unsmooth job flow between the production shops along a manufacturing chain is a problem commonly seen in industries due to the inconsistency in processing speed and delivery between the chained production shops. With many factors involved in the coordination between production shops, the problem is complex and few solutions have been provided to date. This study presents an approach able to solve this problem by implementing time-based manufacturing that enables the speed and timing of each shop's job outflow to match those of its successor shop's job inflow. The proposed method is composed of offline schedule making and online job processing control. It aims to complete each job in a just-in-time (JIT) manner at the time the job is wanted by the next production shop. Designed upon a flexible job shop environment, which is easy to be transformed into other shops with similar characters, the proposed method is expected to be widely applicable to JIT scheduling problems. An industrial case study is made and results show that the proposed method has a strong ability in JIT job completion, tardy job prevention and makespan reduction.

Order Selection of Processed Chicken under Production **Capacity Constraints**

Pachara Chatavithee¹, Kullapapruk Piewthongngam¹, Supachai Pathumnakul¹

¹Khon Kaen University, Thailand

In this paper, an order selection problem for chicken processor is addressed. When customer demand is over the company production capacity, all order could not be satisfied. A mathematical model is developed to choose type of orders should be produced. The objective function of the model is to maximize profit of processor taking into account production capacity constraints. The result demonstrates that the mathematical model could practically solve the problem of the case study company under acceptable computation time.

Clustering Variables Selection in Mass Customized Scenarios Affected by Workers' Learning

Michel Anzanello¹, Flavio Fogliatto¹ ¹Federal University of Rio Grande do Sul, Brazil

In Mass Customized applications, clustering procedures enable grouping product models with similar processing needs into families, increasing the efficiency of production programming and resources allocation. The performance of such procedures is highly dependent on the proper choice of clustering variables. This paper proposes a method to select clustering variables aimed at grouping customized product models into families. Two groups of clustering variables are considered: those generated by expert assessment on product features, and those representing workers' learning rate, obtained through learning curve modeling. The method integrates the "leave one variable out at a time" elimination procedure with a k-means clustering technique. When applied to a shoe manufacturing process, the proposed method significantly reduced the number of variables required for clustering, while increasing the grouping quality measured through the Silhouette Index.

Interactive Online Process Management and Quality Control for Cross-Sited Production Process Chains

Peter Becker¹, Robert Schmitt² ¹Fraunhofer Institute for Production Technology, Germany

²RWTH Aachen University, Fraunhofer Institute for Production Technology, Germany

In our globalized world, cross-sited production process chains are key elements to manufacture cost and resource efficiently and seem to be well established in today's industries. But to produce cross-sited, highly sophisticated production planning between different process steps has to be established to guarantee high quality. To achieve this, process chains and their interfaces have to be well coordinated, managed and quality standards continuously controlled. Specially small and medium-sized enterprises (SME) do have difficulties with world wide coordination of their production. Therefore, this paper will give a comprehensive description of how such tasks can be approached and will introduce an interactive-internet based management tool that enables a smooth cross-sited production.

Periodic Virtual Cell Manufacturing (P-VCM) - Concept, Design, and Operation

Jannes Slomp¹, Dimitry Krushinsky¹, Rahul Caprihan² ¹University of Groningen, Netherlands

²Dayalbagh Educational Institute, India

This paper presents and discusses the concept of Periodic Virtual Cell Manufacturing (P-VCM). After giving an illustrative example of the operation and design complexity of a P-VCM system, we present an industrial case to study the applicability of the concept. The illustrative example and the industrial case indicate the context for which P-VCM is appropriate.

A Novel Virtual Design Platform for Product Innovation Through Customer Involvement

Xingyu Chen¹, Chun-Hsien Chen¹, Kah Fai Leong¹ ¹Nanyang Technological University, Singapore

Involving customers in the product design process on a virtual design platform is thought to be an effective way for new product innovation. However, few studies have been carried out to co-relate the theories developed in marketing and those proposed for product design to develop a viable product innovation platform. There is no widely accepted integrated conceptual model that integrates these views. In the proposed model, a conceptual link between the marketing domain and the product domain construct a virtual design platform for customer's desired value co-creation and knowledge co-production. The different levels of involvers are classified according to three dimensions of customer demographics, customer psychographics and customer expertise based on the customer information derived from marketing segmentation theory. Products are categorized according to explicit product characteristics and virtual product characteristics. Measurement scales for each of these dimensions will be investigated thoroughly. A design process for product innovation based on the theoretical model is proposed. The framework connects customer information and product orientation to provide a novel platform for future product innovation.

Session	Production Planning & Control (2)
Date	Wed, 7 Dec
Time	13:30 - 15:00
Room	Jupiter II
Chairs	Jannes Slomp, Seyyed Mohammad Taghi Fatemi
	Chomi

Adaptive Scheduling by Means of Product-specific Emergence Data

Gunther Reinhart¹, Florian Geiger¹ ¹Technische Universitat Munchen, Germany

The order-driver single and small batch production is characterized by a high variety and the demand for short delivery times. Therefore, a robust production planning is essential. Usually the master data, which is used for scheduling, does not represent the current conditions in the shop floor, due to its static nature. Thus the planning results are of poor quality. To counteract that, this article describes an approach that provides production-state-dependent master data enabled by the RFID (Radio Frequency Identification) technology.

A Worker Assignment for Machine Cluster in the Manufacturing Cell

Suksan Prombanpong¹, Waraporn Seenpipat¹ ¹King Mongkut's University of Technology Thonburi, Thailand

A worker assignment for machine cluster in the manufacturing cell was discussed in this paper. The objective of this paper is two folds. First, it aims to demonstrate a calculation of the maximum number of machines which one worker can optimally operate without an idle time on the machine. Then, the simulation software program is utilized to evaluate various proposed improvement alternatives based on maximum machine efficiency criteria. In this study one of the hard disk drive manufacturers in Thailand was explored. Previously, one worker was assigned to service eight semi-automated machines in the cluster. The main tasks of the worker were loading, checking and recording. Due to the fact that workload of the worker and the machine cycle is not balanced so the utilization of the worker cannot be maximized. Therefore, the optimum number of machines which one worker can ideally service is calculated. It is found that one worker can optimally serve up to eleven machines. However, other alternatives are also explored. As a result, by systematic work elimination, one worker can service up to fourteen machines per cycle with 96.09% machine utilization.

Optimal Production Policy of Production System with Inventory-level-dependent Demand in Segmented Market Yogender Singh¹, Kuldeep Chaudhary¹, P.C. Jha¹

¹University of Delhi, India

A marketing orientation is based on a customer-driven focus. During the past two decades we have seen the rise of market segmentation in business markets. Market segmentation is an essential element of marketing in industrialized countries. It has emerged as a key marketing planning tool and the foundation for effective formulation in industrialized countries and firms. In this paper, we use market segmentation approach in inventory-production system for single product and we assume that firm has single production unit for all segment. The objective is to develop an optimal production policy that minimize the total cost associated with inventory and production rate in segmented market and make use of optimal control theory to solve the production -inventory problem . First, we consider a single source inventory problem with multi-destination demand that vary from segment to segment. Further, we discuss a multidestination demand and inventory problem under the assumption that firm may choose independently the inventory directed to each segment. Both the problems are discussed and solved using optimal control theory approach.

Heuristic Decomposition and LP-based Scheduling in Make-and-Pack Production Philipp Baumann¹, Norbert Trautmann¹

¹University of Bern, Switzerland

In this paper, we are concerned about the short-term scheduling of industrial make-and-pack production processes. The planning problem consists in minimizing the production makespan while meeting given end-product demands. Sequence-dependent changeover times, multi-purpose storage units with finite capacities, quarantine times, batch splitting, partial equipment connectivity, material transfer times, and a large number of operations contribute to the complexity of the problem.Known MILP formulations cover all technological constraints of such production processes, but only small problem instances can be solved in reasonable CPU times. In this paper, we develop a heuristic in order to tackle large instances. Under this heuristic, groups of batches are scheduled iteratively using a novel MILP formulation; the assignment of the batches to the groups and the scheduling sequence of the groups are determined using a priority rule. We demonstrate the applicability by means of a real-world production process.

Robust Optimization Model for Fan Coil Production Planning under Supply Uncertainty

Jamshid Nazemi¹, Roja Żakeri¹ ¹Islamic Azad University, Iran

Optimal Production and capacity planning problems have been one of major operation management concerns researches. The model parameter's challenge effect on the solution has caused most of these practices unreliable. In this research we have considered a Heating, Ventilation and Air Conditioning (HVAC) production planning problem utilizing a supply base network. Proposed optimization model considered three uncertainty parameters of products lead time, machine efficiency and contractor collaboration mechanism. Objective function is minimizing costs of final product and its related parts with over 470 items. Proposed robust stochastic programming model, utilized a scenario approach to handle uncertainty of mentioned parameters. Through combination of three uncertain parameters 27 scenarios produced. Considering scenarios and its related probability, we have analyzed robustness of model. As proposed model has been used for problem with large number of variables and constraints, its framework can be used for similar production planning problems in other industries.

An Application of Network Topology to Understand The Signal in Process Variability: A Case Study in Petrochemical Industry

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¹Universiti Teknologi Malaysia, Universiti Utara Malaysia, Malaysia

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This paper deals with a network topology approach for identifying the root causes of an out-of-control signal. An experience in the production process of fertilizer will be reported.

Session	Human Factors
Date	Wed, 7 Dec
Time	15:30 - 17:30
Room	Jupiter II
Chairs	Jan Pieter Clarys, Mohammed-Aminu Sanda

Monitoring and Classifying Evidence-Based Workload for Profiling Manual Handling Occupations

Jan Pieter Clarys¹, Jonathan Tresignie¹, Aldo Scafoglieri¹, Erik Cattrysse¹ ¹Vrije Universiteit Brussel, Belgium

The majority of employments with occupational musculoskeletal hazards can be classified as manual handling jobs in manufacturing and the public health sector. The purpose of this study was to monitor and classify evidence-based workload of a manual handling target group of nurses using a modified Delphi with three independent consecutive surveys. With its focus on maximizing participants' judgment abilities, the modified Delphi technique is a non-compromising tool for decision making. As a result of three different and independent survey rounds, the tasks and maneuvers of the target group could be divided into six job categories. With 6 and 7 point Likert scales, both loading level and frequency were determined within each category allowing a final evidence-based classification of tasks and maneuvers at risk allowing a better profiling of manual handling occupations e.g. nursing.

Measurement of Handgrip Force of the Dominant Hand at Pre-selected Force Levels for Males

Kai-Wav Li1

¹Chung Hua University, Taiwan

An experiment was conducted to measure the grip force of twenty male subjects under guided-gripping scenario. The subjects were instructed to grip with an exertion level of 20%, 50%, 70%, and 100% of their maximum voluntary contraction of their dominant hands. A linear regression model was established to describe the relationship between the gripping force and the rating of Borg's CR-10 scale. This model was statistically significant at p<0.0001 and with an R2 of 0.9. The Pearson's correlation coefficient between the grip force and the score of the CR-10 scale was 0.9. The results of this study showed that the guided grip force of the dominant hand of the male subjects had linear relationship with the rating of CR-10 scale. Therefore, the CR-10 scale is appropriate as a quantitative measure of perceived hand grip exertion of the dominant hand for males.

Lumbosacral Bending Moment Assessment and Parameter Optimization Using Taguchi Design during Lifting Task in a Steel Rolling Mill

Sarbjeet Singh¹, Sunand Kumar² ¹Government College of Engineering and Technology, India ²National Institute of Technology, India

This paper reports on the investigation of the effect of lifting parameters on lumbosacral bending moment during lifting task. The experimental study has been conducted under varying load weights, horizontal location of load from L5/S1 and lifting technique (stoop, squat and using lifting device). The design of experiments approach using Taguchi's orthogonal array was used. The level of importance of the parameters on bending moment at L5/S1 has been determined using analysis of variance (ANOVA). In the study reduction in bending moment at L5/S1 has been observed after utilizing lifting device.

A Perspective on Human Factors Contributing to Quality **Requirements: a Cross-case Analysis**

Annlize Marnewick¹, H.C. Pretorius¹, Leon Pretorius²

¹University of Johannesburg, South Africa

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Although formal definitions and processes do exist for requirements engineering, projects are still failing due to the poor quality of requirements. This study investigates this phenomenon, in particular the reasons why high quality requirements cannot be delivered. This paper investigates factors contributing to high quality requirements during two requirements engineering processes in practise. Empirical evidence was collected over a five-year period from two case studies focusing on the requirements engineering process to obtain an in-depth understanding of why the process delivered either good or poor quality requirements. The findings suggest that human factors during the communication process play a significant role towards the quality of requirements. This research provides an alternative view on the factors contributing towards poor quality requirements. The skill of communication allows a requirements engineer to create a trust relationship with customers, and this empowers him to elicit high quality requirements from the users.

Occupational Stress, Knowledge Sharing and GSD Communication Barriers as Predictors of Software Engineer's

Creativity Aamir Amin¹, Shuib Bin Basri¹, Mohd Fadzil Hassan¹, Mubashir Rehman¹ ¹Universiti Teknologi Petronas, Malaysia

Human knowledge and creativity is the cornerstone for software development. Creativity has recently been emphasized in software development. However there has not been enough research work addressing creativity of software engineers working in Global Software Development (GSD). The aim of this study is to provide a theoretical framework of creativity in the context of GSD. Using the methodology of literature survey, factors such as knowledge sharing, software engineering occupational stress and GSD communication barriers have been hypothesized to be effecting creativity directly or indirectly. At the end a theoretical framework of software developer's creativity has been presented.

Miners' Tacit Knowledge: A Unique Resource for Developing Human-oriented Lean Mining Culture in Deep Mines

Mohammed Aminu Sanda¹, Jan Johansson¹, Bo Johansson²

¹Lulea University of Technology, Sweden

This research explored the significance of retaining aspects of traditional mining culture attributes as value-adding waste in the introduction of lean mining. The purpose was to understand the influences that aspects of human practices derived from miners' tacit knowledge, and reinforced by traditional mining culture, could have in the molding of a lean culture to facilitate the introduction and sustenance of the lean mining philosophy. Historical and actual data were collected and analyzed by viewing mine culture as attributes, such as values, beliefs, schemas, and implicit theories commonly held among the mine workforce. It is concluded that since the knowledge-oriented human-added value held by individual miners is most commonly transferred through personal experience, such knowledge could be extracted to enhance the development of a human-oriented leaner mining culture to encapsulate the existing lean mining philosophy.

Identifying the Meaning of Information Signs in Traffic Facilities

Hsien-Yu Tseng¹, Bor-Shong Liu¹

¹St. John's University, Taiwan

This purpose of present study was used the signal detection theory to evaluate the proper way to identify the meaning of information signs in traffic facilities. An empirical study of information signs used in the Taipei mass rapid transit system was performed to assess the proposed model. The clear and definite implication of posted signs and the impact those signs have on cognitional decision-making were measured by the sensitivity index d^\prime and bias β as defined by signal detection theory. For the design of information signs, the ease with which a sign can be identified not only depends upon the clarity of the signs but also depends on cognizable judgment tendency. A properly designed pictograph will have an impact on the convenience of the general public. Placing importance on sign design and human convenience will enhance the satisfaction of patrons with public facilities.

Analysis of Design and Purchase Decision of Central Dust Collection System

Yeasin Bhuiyan¹, A.l. Khan²

¹Bangladesh University of Engineering and Technology, Bangladesh ²University of Kentucky, United States

This paper presents a better solution for wood dust collection and consumer understanding for the purchase decision making of the central dust collection system in case of Bangladeshi Furniture Industries. Dust collection system is an integral part of furniture industries where quality products, proper safety, operations and maintenance are sought. An efficient woodworking dust collection system is a priority for furniture industries to maintain their business. The greatest source of problems with dust collection systems is improperly designed ducting and hood arrangements. In order to make an educated decision in purchasing dust collector a clear understanding of all the parameters involved is necessary. This paper illustrates an improved design of central dust collection system for woodworking taking into account appropriate control of dust suction systems, moisture, air speed, duct and hood design, installation etc. The proper equipment and design may cost a bit more initially but the cost of fire, explosion, the resulting down time and escalating insurance costs make it a sound investment.

Session	Global Manufacturing and Management
Date	Wed, 7 Dec
Time	11:00 - 12:30
Room	Jupiter III
Chairs	Alan Pilkington, Shin-Guang Chen

Role of Knowledge Management in World Class Manufacturing: an Empirical Investigation

Abhijeet Digalwar¹, Kuldip Singh Sangwan¹ ¹Birla Institute of Technology and Science, India

Today companies are facing important challenges such as the need to

reduce the time-to-market, the development cost and manufacturing cost, or the management of products with more and more technology. As a result, this current situation is encouraging the implementation of world class manufacturing and new management techniques such as knowledge management (KM) to increase competitive advantage. Many researchers theoretically justified the role and benefits of knowledge management in world class manufacturing. In this study an attempt has been made to empirically examine the role and benefits of knowledge management in world class manufacturing.

Statistical Quality Control Measurement on Furniture Manufacturer

Laurence¹, Christine Puteri Utama¹, Jessica Hanafi¹

¹University of Pelita Harapan, Indonesia

A research on the application of statistical quality control technique was conducted in a furniture manufacturing company. This company produces a variety of wooden furniture, such as tables and chairs, to cater local and overseas customers. Based on initial observation, it was found that the product with the highest percentage of defects is the folding chairs. Statistical quality control technique was applied to ensure that the products meet the standard specified. This research identified five major defects based on the pareto rules. Those defects are pin holes (26.03%), heart wood (22.5%), breakage (17.57%), cracks (17.57%) and discoloration (8.7%). The DPMO for the folding chair production is 5,135.77 and the daily unreworkable cost for one of the components of the chair is IDR 1,961,630.

The Influence of Geothermal Environment to the Quality of Porcelain Insulator: A Correlation Analysis

Syahidah Yusoff¹, Maman Djauhari¹ ¹Universiti Teknologi Malaysia, Malaysia

It is assumed that polluted environment reduces the quality of porcelain insulator in terms of leakage current. In this paper we conduct a correlation analysis to understand to what extent the influence of geothermal area to the quality of porcelain insulator. An example will be discussed and a recommendation will be presented.

Learning Organisation in New Zealand and Malaysian Manufacturing Companies

Affandi Mohd-Zainal¹, Jane Goodyer¹, Nigel Grigg¹, Jafri Mohd Rohani² ¹Massey University, New Zealand

²Universiti Teknologi Malaysia, Malaysia

This paper presents a comparison between learning organization culture in New Zealand and Malaysian manufacturing companies. Learning organization was measured by using Watkins and Marsick's Dimension of Learning Organisation Questionnaire (DLOQ) survey questionnaire. The collected data were analysed to assess the reliability and validity of the measurement score of the DLOQ. The data were further analysed so as to determine the differences between New Zealand and Malaysian companies with respect to the presence of a learning organisation-oriented culture. Results of the analysis show that DLOQ are equally reliable and valid in both New Zealand and Malaysian manufacturing context. It was also found that there are significant differences between New Zealand and Malaysia in several dimensions of learning organisation; namely team learning, dialogue inquiry and empowerment. The differences may be attributed to cultural differences between New Zealand and Malaysia.

Integration of Production and Supply Chain Strategic Planning for Renewable Resources under Sustainability Considerations: Teakwood Case Study

Bobby Kurniawan¹, Muhammad Hisjam², Wahyudi Sutopo³ ¹Bandung Institute of Technology, University of Sultan Ageng Tirtayasa, Indonesia ²Sebelas Maret University, Indonesia

³Bandung Institute of Technology, Sebelas Maret University, Indonesia

This paper studies developing country teakwood production and supply chain under sustainability considerations. Although teak is a renewable resource, it requires long time to be harvested again. Furthermore, teak demand tends to increase from time to time. A teak production and supply chain model is developed to find optimal teak production and distribution that maximizes economical aspect, while maintaining renewable resource preservation and social benefit. Whole stand growth model is used to simulate growth of the planted forest. Linear fuzzy Chance Constrained Model (CCM) optimization is deployed to find the solution and implement uncertainty to production capacity, demand, and prices parameters. Simulation and optimization are recursively conducted for every period of time. The result shows that sustainability in teak industry can be achieved after rotation time.

On Work Performance for the Labor-intensive Manufacturing Shin-Guang Chen¹

¹Tungnan University, Taiwan

Today, the pressure of economic globalization pushed many manufacturers to move to the developing countries and to start the lower-cost labor-intensive manufacturing (LIM). For example, China is called the world factory in the global economy. The performance evaluation for such kind of labor-intensive process is important for these developing countries. The traditional productivity-based performance indicators are usually used for evaluating the throughput of an entity (an individual or a department). They may not be feasible for assessing the aggregated performance in a complex process across various departments. This article proposes a novel probabilistic method for evaluating the aggregated work performance in a LIM. The proposed approach is not only assessing the aggregated process performance, but also providing the suggestions of individual enhancement for process improvement. Some numerical examples are illustrated to show the merits of this approach.

Session	Engineering Education and Training
Date	Wed, 7 Dec
Time	13:30 - 15:00
Room	Jupiter III
Chairs	Seng Fat Wong, Richard Fung

In House Industrial Training for Mechanical Engineering Students: a Multidisciplinary Approach

S.K. Li¹, KK Lau¹, Vincent Li¹

¹Hong Kong University of Science and Technology, China

The integrated knowledge in the application of mechanical engineering, microprocessor and electronic sensor technologies is becoming the basic skill of a modern engineer in machinery based processes. To meet this objective, we have developed a cross-disciplinary industrial training to teach essential hard technical and soft project skills to the mechanical engineering students in mid-curriculum. Ten groups of students were selected to participate in a 150 hour program. The students were required to design and build a robot with ability to follow tracks and pick/place target blocks in specific locations. The students were trained to integrate the knowledge of computer aid design, electronics, sensor theories and motor technology to fabricate a workable robot as a major outcome of this course. On completion of the project, students competed for top robot honors by demonstrating their robots' movements and performance in pick/place to a panel of judges.

RFID-Aided Manufacturing Training System and Localization

Seng Fat Wong¹, W. I. Ho¹, Zhixin Yang¹, C. T. Kwok¹ ¹University of Macau, Macau

Knowledge transmission in workshop is relied on the demonstrations of operating machines by senior technicians. It is time consuming and inefficiency, a trainer can teach few trainees simultaneously meanwhile the performance cannot be ensured and is just depended on the trainee's talent, and also some techniques may be lost. RFID-Aided Training System is used for knowledge transmission, especially available in tacit to explicit knowledge for reducing manpower and time. Compare with the other E-learning systems, the wireless communication function of RFID can accrue automation to provide inspection and data receiving for the knowledge base to keep on growing. In this study, a professional training system for manufacturing is developed, and RFID can be applied in different approaches to enhance the system. Besides the simple login function, the learning process monitoring, materials management, alerting safety signal and the tool searching function with LANDMARC algorithm can also be RFID aided.

Students' Experiences in Different Forms of Support during **Doctoral Studies**

Katia Lahenius¹, Salla Maatta² ¹Aalto University, Finland

²University of Jyvaskyla, Finland

Doctoral student experience has been seen to have impact on study satisfaction and further the successful degree completion. Earlier research suggests that students need different forms of support during their studies. Therefore, this study investigates how different forms of support effect on doctoral students' experience in progress, particularly in experienced progress in research. The study was conducted in one Department of Industrial Engineering and Management in Finland. The quantitative data (N=64) was collected for the study. The results indicate that only network and peer support has a positive effect on students' experienced progress in research.

Educational Game Concept for the Transfer of Results from the Transdisciplinary Research to the New Scientific

Generation Florian G. H. Behncke¹, Moritz King¹, Udo Lindemann¹ ¹Technische Universitat Munchen, Germany

Transfer of knowledge through educational games is emphasized within the last decades to support the knowledge construction process, irrespective of the declining attention of the new scientific generation. With the research driven nature of founded projects at university, the challenge of knowledge transfer is even intensified by its specific and abstract character. This paper concentrates on the design of an educational game, which features entertainment and educational value at the same time in contrast to other approaches. Based on the presentation of educational and game objective, the game concept illustrates how results of transdisciplinary research can be transferred to the new scientific generation. Passing through the innovation process of a product-service-system of a fictitious company, the player accomplishes tasks, gaining a profound understanding of the innovation process, cycles within that process and the underlying methods. Therewith, the Cycle Labyrinth illustrates how abstract knowledge is imparted to the new scientific generation.

Quantitative Analysis of International Mobility of Robotics Researchers and Characteristics of Domestic Robotics Research

Takao Furukawa¹, Nobuyuki Shirakawa¹, Kumi Okuwada¹, Kazuya Sasaki² ¹National Institute of Science and Technology Policy, Japan ²Utsunomiya University, Japan

The international mobility of robotics researchers is quantitatively evaluated by analyzing biographical notes accompanying journal papers. Mobility patterns illustrate that the United States, Canada, and Singapore attract robotics researchers from abroad as IQ magnets. Canada can be considered as an alternative to the United States for hosting Iranian robotics researchers. The relationship between the number of authors and bachelor's degree holders categorizes countries as hosts or sources of researchers. The characteristics of active topics of robotics research in major countries are also mentioned.

Green Design Principles and Trends of Using Them among Bangladeshi Consumer Goods Manufacturers

Md. Shahriar Jahan Hossain¹, Nafis Ahmad¹ ¹Bangladesh University of Engineering and Technology, Bangladesh

Environmental awareness continues to rise, and customers of all types are realizing the importance of eco-friendly products which are essential to protect our planet. Green design rules are needed to support the implementation of environmental features in the practical design situation. Green design or Design for Environment (DfE) is a field of product design methodology that includes tools, methods and principles to help designers reduce environmental impact. The main objective of this work is to compile a set of DfE principles that are useful during the design process. Later the trends of Green Manufacturing in Bangladesh are studied. Today, many industries in Bangladesh are aware of green design and implementing DfE principles. The present situations about the Green Design trends in some of the leading consumer goods manufacturers, Unilever Bangladesh, PRAN-RFL Group and Rahimafrooz were studied. Moreover the Government's recent initiatives concerning DfE are discussed in this article. Though the list of compiled DfE principles is based on best practices, further work is needed to expand the list.

Session	Intelligent Systems
Date	Wed, 7 Dec
Time	15:30 - 17:30
Room	Jupiter III
Chairs	Nan Chen, R. J. Kuo

Evolutionary-Based Support Vector Machine

R. J. Kuo¹, C. M. Chen²

¹National Taiwan University of Science and Technology, Taiwan

²National Taipei University of Technology, Taiwan This study proposed a hybrid of artificial immune system (AIS) and particle swarm optimization (PSO)-based support vector machine (SVM) (HIP-SVM) for optimizing SVM parameters. In order to evaluate the proposed HIP-SVM's capability, six benchmark data sets, Australian, Heart disease, Iris, Ionosphere, Sonar and Vowel, were employed. The computational results showed that HIP-SVM has better performance than AIS-based SVM and PSO-based SVM.

The Effectiveness of Hybrid Negative Correlation Learning in Evolutionary Algorithm for Combinatorial Optimization Problems

Ronnachai Sirovetnukul¹, Parames Chutima², Warin Wattanapornprom²,

Prabhas Chongstitvatana²

¹Mahidol University, Thailand ²Chulalongkorn University, Thailand

Most evolutionary algorithms optimize the information from good solutions found in the population. A selection method discards the below-average solutions assuming that they do not contribute any information to update the probabilistic models. This work develops an algorithm called Coincidence algorithm (COIN) which merges negative correlation learning into the optimization process. A knight's tour problem, one of NP-hard multimodal Hamiltonian path problems, is tested with COIN. The results show that COIN is a competitive algorithm in converging to better solutions and maintaining diverse solutions to solve combinatorial optimization problems.

A New Guillotine Placement Heuristic Combined with an Improved Genetic Algorithm for the Orthogonal Cutting-Stock Problem

Slimane Abou Msabah¹, Ahmed Riadh Baba-Ali¹

¹University of Science and Technology Houari Boumedienne, Algeria

The orthogonal cutting-stock problem consists in finding an optimal arrangement of n items on identical dimension bins. Several placement heuristics are used to perform this task. In our article, we are interested in the orthogonal cutting problem, taking into account the guillotine and the orientation constraints. We propose a new placement heuristic inspired by the BLF routine, which tries to place the items in levels, to check the guillotine constraint, while exploiting intra-levels residues, in two directions, vertically, then horizontally. Our heuristic named BLF2G, will be combined with an improved genetic algorithm, to be compared with other heuristics and metaheuristics found in literature, on made and existing data sets.

Intelligent System for Wind Generating Plant

Yoko Amano¹

¹Nihon University, Japan

This paper proposes a new intelligent system for a wind generating plant with various nonlinear uncertainties. The intelligent system based on neural networks can adaptively control the wind generating plant contained various modeling errors and parametric variations. For increasing learning speed and simplifying an algorithm of the neural networks, a new PD (Proportional Differential) learning rule of the neural networks is derived. In order to explain the validity and the reliability of the intelligent system, it is applied to a simulation model of the wind generating plant with typical nonlinear uncertainties. The simulation results show that the proposed intelligent system is superior and powerful to the generating plant.

Collaborative and Non-Collaborative Dynamic Path Prediction Algorithm for Mobile Agents Collision Detection with Dynamic Obstacles in a Two-dimensional Space Elmir Babovic¹

¹FIT Mostar, Bosnia and Herzegowina

In this research a new algorithm for dynamic collaborative path prediction for mobile agents is proposed. This algorithm is inspired by human behavior in group of dynamical obstacles. Mobile agent in collaborative manner uses coordinates of other mobile agents in the same environment to calculate and based on statistical methods predict future path of other objects. For this purpose spatial-temporal variables are decomposed in order to optimize the method and to make it more efficient. This algorithm can be used in mobile robotics, automobile industry and civil aeronautics. Moreover this method allows full decentralization of collision detection which allows many advantages from minimizing of network traffic to simplifying of inclusion of additional agents in relevant space. This algorithm in his implementation will be low resource consuming allowing mobile agents to free resources for additional tasks.

Component-Integrated Sensors and Communication for Gentelligent Devices

Ludger Overmeyer¹, Lutz Rissing¹, Marc C. Wurz¹, Michael Dumke¹, Stefan Franke¹, Tim Griesbach¹, Alexander Belski¹

1Leibniz University Hannover, Germany

Parts which inherently store data about their fabrication, gain load data during their life cycle, machine components that autonomously monitor themselves and arrange inspections as required will be reality in the Collaborative Research Centre 653. The vision of the CRC 653 'Gentelligent Components in their Lifecycle - Utilisation of Inheritable Component Information in Production Engineering' is the development of parts which exhibit a physical breakup of device and related information. This paper presents techniques of writing and reading information in the surface zone of mechanically stressed devices, a modular micro sensor concept to measure load during the devices production time and lifecycle as well as communication strategies for data exchange between different components and on component level.

Data Mining Application for Customer Segmentation Based on Loyalty: An Iranian Food Industry Case Study

Ali Hajiha¹, Reza Radfar¹, Samira Sarafi Malayeri²

¹Islamic Azad University, Iran ²Islamic Azad University, United Arab Emirates

Data Mining (DM) is a powerful new technique to help companies discover the patterns and trends in their customers' preferences. It is also a well-known tool for customer relationship management (CRM). Data mining methodology has made a tremendous contribution for researchers wanting to extract hidden knowledge and information. This study has proposed a new procedure, based on an expanded RFM model, by including two additional parameters D and C. It constructs a model for clustering customer value based on RFMDC attributes and K-means algorithm. We evaluate the result and suggest suitable behavior policies for each cluster. The developed methodology has been implemented for Kalleh dairy company in Iran to illustrate the proposed procedure.

Technology and Knowledge Sharing Strategy in Systems Engineering Practice performed by Indonesian Expatriate Engineers

Ika Windiarti¹, Timothy Ferris¹, Matthew Berryman² ¹University of South Australia, Australia

²University of Wollongong, Australia

Systems engineering practice performed by Indonesian expatriate engineers involves intra-project-team cultural diversity. In culturally diverse project teams, one of the key success factors in project performance is technology and knowledge sharing. This paper identifies elements of how technology and knowledge sharing work performed in systems engineering practices is influenced by cross-cultural adaptation in multicultural work environments. We interviewed 18 Indonesian engineers working outside Indonesia in multicultural teams, about the implementation of systems engineering practices in their experience and their knowledge of cross-cultural adaptation. The results indicate three factors that influence the technology and knowledge sharing strategy in culturally diverse project teams: communication; authority perception; and staff development strategy.

Session	Poster Session 1	
Date	Wed, 7 Dec	
Room	Venus III	

An Integrated Multi Agent Based Model to Find the Most Agile Supplier

Hoda Ghahremanloo¹, Mohamad Jafar Tarokh¹ ¹K. N. Toosi University of Technology, Iran

Agile Supply Chain Management (ASCM) increasingly becomes an effective and important measure to enhance competitive advantage of modern enterprises. This paper contributes to the discussion on agility in SCM and provides a novel focus on the integration in ASC. The structure of Multi-agent systems inherently meets the requirements of autonomy and decentralization for supply chains. This research proposes a multi-agent-based model of ASCM that is capable of supporting the resource coordination between agents through a combinatorial action mechanism as well as selecting agile supplier. Finally, this model is validated by means of Fuzzy Multi objective linear programming. Using mathematical deduction enables an integrated ASCM model of selecting agile supplier being translated into a linear programming problem and consequently it has been solved by Lingo software.

Measuring Supply Chain of Packed Milk from Consumer Perspective in Pakistan

Fariza Kamran¹, Osman Babar¹, Muhammad Asim²

¹National University of Sciences & Technology, Pakistan

²Center for Advance Studies in Engineering, Pakistan

This paper aims to know consumer perspective of packed milk supply chain in Pakistan. Comprehensive study has been carried out by conducting survey from people belonging to different locations, professions and age. Overall industry has been our focus of study. It is found that there is still potential to bring betterment and advancement in supply chain of packed milk industry. As trends of consumers changing packed milk industry can flourish itself and provide better options to its customers. By focusing on proposed strategy milk industry can significantly increase its market share and can replace Gawalas/ classic milkman (who sells fresh milk from door to door in milk can).

Impact of Product Design Decisions within Product **Development on the Supplier Selection Process at the** Automotive Industry

Florian G. H. Behncke¹, Katrin Abele², Udo Lindemann¹ ¹Technische Universitat Munchen, Germany

²Dr.-Ing. h.c. F. Porsche AG, Germany

Answering the competitive pressure, companies from the field of customer and capital goods significantly reduce their in-house production depth in favor of a higher involvement of suppliers. As a result, a company's success is dependent of the performance of their supply chain. The selection of suppliers is supported by several methods, which focus on operative decisions, but neglect the influence of product design decisions within development on the selection process. Based on the design decisions, significant areas of the supply chain structure are determined implicitly. The resulting discrepancy between the planned and the actual supply chain structure determination, lead to a limitation of the latitude for the supplier selection. In order to improve the supplier selection process, this paper presents effects of product design decisions on this process.

A Measurement Model for Collaboration between Suppliers and Manufacturers

Pingyuan Zou¹, Hao Zhang¹ ¹Beijing Technology and Business University, China

This research establishes a measurement model to solve the problems exist in the collaboration of the supply chain alliances, especially between suppliers and manufacturers. This paper firstly identifies 21 indicators including the profit level and the management level of the suppliers and manufacturers through expert brainstorming method and determines weight of each indicator by experts scoring. Then the authors get the collaboration index (C), comprehensive evaluation index (T) and obtain collaboration degree (D) including Primary, Transition, Intermediate, Good and Excellent. At last, the authors do empirical analyses using enterprise data to prove the model to be practical and give suggestions to the enterprises to keep their strategic collaboration.

An Optimization Model for Global Supplier Selection Ramzi Hammami

¹Toulouse Business School, France

In this paper, we propose an optimization model for the supplier selection in the global context. Pertinent global factors are considered in the model such as the uncertainty and fluctuation of exchange rates and the delivery lead time uncertainty. We linearize the model and solve it with the commercial software Cplex. Some managerial insights that illustrate the practical and the theoretical interest of the model are discussed.

Service Supply Chain Practices from the Perspective of Malaysian Tourism Industry

T.K. Hong¹, Suhaiza Zailani¹ ¹Universiti Sains Malaysia, Malaysia

The use of supply chain management is not mature generally in business, and especially in the service sector. Studies of tourism supply chains or their equivalents, such as tourism value chains or tourism industry chains, have been limited. Therefore, this paper is mainly to discuss on the relationship of service supply chain practices in tourism industry in Malaysia. Due to the problems defined, this research need to investigate and examine the aspects that are the key elements to keep and help the industry to be sustained.

Optimal Selection of Location for Distributed Generations to Ensure a Competitive Advantage Using Fuzzy Analytical Network Process

Mahdiyeh Montazeri¹, Mohammad Saleh Owlia², A Moghimi³, Mohamad Kamalzadeh⁴

¹Mazandaran University of Science and Technology, Iran

²Yazd University, Iran

³Taft PNU university, Iran

⁴Industrial Engineering, Iran

Population and industry growth has increased power consumption and consequently development of new power generators is inevitable in country. Costs of high production and transfer for large-scale power stations, has attracted new attentions to Distributed Generations (DGs) in recent years. With considering the capacity and location of these units, significant improvements on the distribution networks could be gained, although their miss-allocation will increase the network losses and transmission and distribution costs. This paper was aimed at prioritizing suitable places for the construction of the DGs in Yazd province in Iran. The ANP method was selected as decision making model because of the interrelationship between the criteria and also because the levels of decision could not be considered independently. Besides, as human judgments have fuzzy nature, the analysis was performed using fuzzy numbers. The criteria, sub-criteria and alternatives were specified by using the ideas of managers and experts in Yazd Power Distribution Company.

A Self-Crossover Genetic Algorithm for Job Shop Scheduling Problem

Shiwang Hou¹, Yongjiang Liu¹, Haijun Wen¹, Yuepeng Chen¹ ¹North University of China, China

During the application of Genetic Algorithm (GA) for job shop scheduling problem (JSSP), chromosome representation and evolution strategy are the main consideration in order to guarantee the feasibility of solution. Crossover operation between two feasible solutions (parents) may result in infeasible solution (offspring).Inspired by the existence of self-reproducing in nature, this paper presents a self-crossover genetic algorithm for job shop scheduling problem (JSSP). The chromosome representation of the problem is based on work piece and the crossover operation is based on single individual. The approach was tested on a standard six-job six-machine (6x6) JSSP. The computational results validate the effectiveness of the proposed algorithm.

A Solution to the Capacitated Lot Sizing Problem

Zhicong Zhang¹, Weiping Wang¹, Shouyan Zhong¹, Kaishun Hu¹ ¹Dongguan University of Technology, China

We study a capacitated dynamic lot sizing problem with special cost structure involving fixed setup cost, freight cost, production cost and inventory holding cost. The freight cost is proportional to the number of containers used. We investigate the problem in which the maximal production capacity in one period is integral multiple of the capacity of a container and reveal the special structure of the optimal solution. We transfer the lot sizing problem into a shortest path problem and propose a network algorithm to deal with it. The T-period problem is solved in O(T4) effort by the network algorithm.

Non-cooperative Game Decision for Capacity Evaluation under Output Demand Uncertainty

Ting Yang¹, Dinghua Zhang¹, Bing Chen¹, Shan Li¹ ¹Northwestern Polytechnical University, China

In order to solve decision problem for maximum production capacity of different products under output demand uncertainty, the non-cooperative game theory was introduced to describe competition relationship between various products for shared manufacturing resources. Firstly the production line model is built based on complex network, which the manufacturing resources was aggregated to manufacturing vertices and the process relationships was described as directed edges between vertices. Secondly the production capacity was evaluated through process analysis on running process of production line and manufacturing vertices, which available capacity and duty load of vertices were defined. Then the definition about Nash equilibrium was presented in course of solving maximum capacity. Finally an aero-engine casing production line was regarded as the research object. Then the optimal production capacity under output demand uncertainty is obtained. The effectiveness and feasibility of game decision model are proved.

Losses Caused by the Presetting of Tools by the Manual Method

Milton Vieira Junior¹, Jose Martinele A. Silva¹, Ivan Correr², Nivaldo L. Coppini¹, Elesandro A. Baptista¹

¹University Nove de Julho, Brazil

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In the search for competitiveness machining companies are applying concepts of lean manufacturing, like the fast setup, for the elimination of losses in the process. However, most of the companies users of CNC machines still face a significant barrier in this field: the presetting of tools is usually performed manually, and requires high times for the preparation of the machines. In this paper the losses in production caused by the manual presetting operations are detached, showing the results in terms of delays generated in the setup operations of machines, and also the reductions in the utilization rates of CNC machines.

Feature Fatigue Analysis Based on Behavioral Decision Making

Mingxing Wu¹, Liya Wang¹ ¹Shanghai Jiao Tong University, China

Feature fatigue represents the phenomenon that customers prefer to choose high-feature products at the purchasing moment (before use); but once they start using the products (after use), they become overwhelmed by the complexity of these high-capability products and annoyed by the features they realize they don't want or need. Feature fatigue will decrease customer satisfaction and negatively impact manufacturer's long-term profit. In this paper, we propose a novel method based on behavioral decision making theory to analyze feature fatigue. We adopt six-dimensional perceived value model to analyze the effect of adding features on customer's perceived value before and after use. Further, we propose an analysis model to analyze feature fatigue quantitatively.

Value Stream Mapping Simulation Using ProModel Software

Nivaldo L. Coppini¹, Luiz C. Bekesas¹, Elesandro A. Baptista¹, Milton Vieira Junior¹, Wagner C. Lucato¹

¹University Nove de Julho, Brazil

Value Stream Mapping (VSM) is a tool that has been used in lean manufacturing to redesign production systems in several industrial sectors. As part of lean principles, the VSM is a pictorial technique used to identify several kinds of wastes existing in the manufacturing floor and enables an easy way to visualize possible alternatives to eliminate them. The company considered for the research is a traditional manufacturer of industrial gearboxes and auto parts, who has been using the VSM to locate and eliminate wastes for a family of products. This paper proposes the utilization of ProModel® 7.0 software as a simulation tool to build-up and evaluate several alternatives for the future state value stream map (FSVSM). As a result it was possible to conclude that simulation represents a valuable strategy to obtain an optimized solution for the FSVSM, as it allows the analysis of several alternatives and many manufacturing indicators.

Simulation for Implementing RFID-EPC in Reverse Supply Chain Based on Consumer Market

Viaolun Gu¹, Tiegang Gao² ¹Tianjin University of Technology and Education, China ²Nankai University, China

RFID-EPC can help to reduce the uncertainty of the quantity of collected used-products in reverse supply chain by using real-time monitoring. At the same time, the monitoring cost will affect the total profit of the reverse supply chain. So, when to implement RFID-EPC is a crucial problem. In this paper, we will simulate the implementing of RFID-EPC in reverse supply chain based on the consumer market: demand exceeds supply, supply exceeds demand, and demand equals supply approximately. Demand means the demand of remanufactured products and supply means the supply of collected used-products. The simulation results show that the implementing of RFID-EPC will increase the total profit of the reverse supply chain when demand exceeds supply and demand equals supply approximately. RFID-EPC can be implemented in reverse supply chain in these two situations. When supply exceeds demand, RFID-EPC shouldn't be implemented.

The Use of Artificial Neural Network (ANN) for Modeling of Diesel Contaminated Soil Remediation by Composting Process

Mehrdad Khamforoush¹, M-Javad Rahi¹, Tahmas Hatami¹, Kourosh Rahimzade²

¹University of Kurdistan, Iran

²National Iranian Oil Products Distribution Company, Iran

In this study two models for remediation of diesel contaminated soil by composting process were used: mathematical modeling and artificial neural network (ANN) modeling. The mathematical model was solved iteratively and validated with experimental data. Then, a three-layer back propagation ANN was trained, tested and validated to predict the decomposition of diesel in contaminated soil according to 3600 data sets which were obtained from mathematical model. The Best neural network result has been obtained with one hidden layer network, with 14 neurons. "tansig" for hidden layers and "purelin" for the output layer gave the best performance compared to other activation functions. The ANN architecture contains six inputs. Diesel decomposition percent is the only output of ANN. ANN predicted results are very close to the target data. The high correlation coefficient, 0.9995, between the network prediction and the corresponding data proves that ANN modeling is a satisfactory method for remediation process.

Integrated Development of Space Systems - Design for AIT - Design for Assembly, Integration and Testing of Satellites - D4AIT

Adalberto Coelho Silva¹, Geilson Loureiro¹

¹National Institute for Space Research, Brazil

The Satellite Assembly, Integration and Testing (AIT) activities are a logical and interrelated sequence of events. The main objective in this phase of a space program development is to achieve a high degree of confidence that the satellite complies with its specified performance parameters. Traditional simultaneous engineering space systems (e.g. satellite) development can have a better approach for taking into consideration AIT requirements during the initial phases of satellite conception and project detailing. By combining model driven system design approach with simultaneous engineering concepts for process modeling, AIT requirements at system level can be dealt with during satellite conceptual and detailed design. AIT requirements comprise electrical, mechanical and environmental requirements. This paper aims to present a new process for the development of satellites, that includes - electrical, mechanical and environmental requirements of assembly, integration and testing (AIT) of satellites, at the system level, already at the design stage of the satellite project.

Using Structural Complexity Management for Design Process Driven Modularization

Harrys Daniilidis¹, David Hellenbrand¹, Wolfgang Bauer¹, Udo Lindemann¹ ¹Technische Universitat Munchen, Germany

High internal complexity and variety is a common situation nowadays in most enterprises. In order to reduce complexity and thereby costs and development time enterprises strive to rationalize their product architectures through modular design. This paper introduces a systematic approach and methodology to modularize a product architecture from the design process viewpoint by using the general procedure of structural complexity management.

Study on Dynamical Properties and Simulation of a Four-Dimensional Nonlinear Discrete Dynamics

Jing Peng¹, Zehua Miao², Luoping Zheng³ ¹Shijiazhuang University of Economics, Tianjin University, China

²Shijiazhuang University of Economics, Beijing Institute of Technology, China

³Shijiazhuang University of Economics, China

We study a nonlinear discrete dynamic game model of an oligopoly market. In order to study competition process of the players, the paper considers a Bertrand model with bounded rationality. A game with four oligopolies is modeled by a four-dimensional nonlinear difference equation set. The stability of the equilibrium point are discussed. We demonstrate rich dynamical behaviors of the system. The chaotic features are justified numerically via bifurcation diagrams, the maximal Lyapunov exponents and the system's sensitive dependence on initial conditions. It is demonstrated the increasing of price adjustment parameters might change stability of the Nash equilibrium and cause bifurcation and chaos. Different from the former literatures, we find that chaos maybe caused by interaction of some elements of the system. On that basis, the main factors might lead the system to chaos are discussed.

Organizational E-Readiness Impact on E-Procurement Implementation

Naseebullah Langove¹, Shuib Bin Basri¹, P. D. D. Dominic¹, Muhammad Jehangir¹

¹Universiti Teknologi Petronas, Malaysia

Electronic Procurement (E-procurement) has been recognized as a competitive source to improve the service of delivery and reduce the cost of goods. However, the successful implementation of E-procurement is uncertain among procurement executive due to non organizational e-readiness. This paper presents an organizational e-readiness model that significantly contributes to E-procurement implementation. A quantitative survey approach is used to collect data from a sample of 142 manufacturing industries of Malaysia. The findings show that top management support, IT infrastructure and suppliers support/commitment has a positive correlation and significant relationship with organizational e-readiness while organizational e-readiness has a strong positive correlation and significant relationship with E-procurement implementation.

Technological Economic Study for Ocean Energy **Development in China**

Tianqi Wang¹, Peng Yuan² ¹Zhejiang University, China

²Ocean University of China, China

This paper reviewed both domestic and abroad development of ocean energy exploitation, stressed on the importance of technological economic analysis approach and established comprehensive evaluation system of utilization projects. We apply fuzzy comprehensive evaluation method, Delphi method and analytic hierarchy process to integrate evaluation results of economic, social and environmental effectiveness. This paper also prospected future of ocean energy development and gave some suggestions on speeding up development of ocean energy in China.

Profit Generation in a Machining Service Provider -**Optimization Combining Theory of Constraints and** Contribution Margin Concept

Elesandro A. Baptista¹, Wagner C. Lucato¹, Nivaldo L. Coppini¹, Milton

Vieira Junior¹, Luiz C. Bekesas¹

¹University Nove de Julho, Brazil

This paper proposes a method for machining service providers to determine cutting speeds that could maximize their financial returns. This is done based on measures considered by the Theory of Constraints (TOC) and the contribution margin concept. It starts by defining the cutting parameters and their relationship to the machining costs. Also, TOC principles are examined in relation to the financial gains obtained as a result of the bottleneck analysis. Finally, this paper proposes to combine both sets of concepts in such way that a relationship between financial gains and cutting speed is established. A graphical solution identifies the cutting speed that maximizes the financial gains for a given part and a linear programming approach expands the concept for real life situations where several different parts are machined at the bottleneck. Hence this approach could be helpful to machining service providers for maximizing their profitability fully utilizing their bottleneck equipment.

Understanding Project Success: The Four-Level Project Success Framework

Eskander Howsawi¹, David Eager¹, Ravindra Bagia¹

¹University of Technology Sydney, Australia

It is acknowledged in project management literature that a project's success means different things to different people. This implies that the definition of success will be different for each project. However, success is a common goal for projects regardless of the specific definition for each project. This statement implies that there can be a common approach in planning for success and generalized framework that can guide the process of defining and planning the project success for different projects. This paper presents the underlying framework that directs the optimum success definition and planning process. Through a literature review and classification of success criteria, a four-level success framework was developed, namely: context level: business level; product level; and project process level. This framework explains the relationship between levels and provides guidelines for decision process. The framework is generalized and can be applied to most projects.

Probabilistic Sustainable Design Using Multiobjective **Optimization Model**

Jui-Sheng Chou¹, Thanh-Son Le¹

¹National Taiwan University of Science and Technology, Taiwan

Project managers (PMs) are currently charged with achieving a balance between cost and duration, and must consider environmental factors to reach sustainable development. This work proposes a novel probabilistic multi-objective optimization algorithm to attain sustainable construction cost, project duration, and CO2 emissions simultaneously in an uncertain project environment. The algorithm, based on particle swarm optimization integrated with Monte Carlo simulation, is applied to generate a low-carbon economy and cleaner production. A typical construction project is selected to demonstrate the application for making sustainable decisions with a set of non-dominant design solutions under multi-objective optimization.

The Role of Time, Cost and Quality in Project Management

Nurul Izah Anuar¹, Poh Kiat Ng¹ ¹Multimedia University. Malaysia

Project management has emerged as a field of practice that is being used increasingly by organizations to achieve their business goals. Since the concept 'survival of the fittest' best describes today's business environment, good project management performance assessment tools are needed in order to make an organization 'the best of the best'. Project completion within time and cost, while maintaining quality is very important for the success of projects. Therefore, the purpose of this paper is to analyse the key variables of time, cost and quality and determine their roles in project management performance. A problem was constructed together with different scenarios to analyse the relations of these variables according to conditions given. With the help of Microsoft Project, the authors were able to narrow down the findings in all scenarios and summarize the patterns of strategies based on these variables to make an appropriate decision on planning the project.

A Study of Measuring the Impact of Employee Perception on Business-IT Alignment via Neural Network

T. C. Wong¹, Shing-Chung Ngan¹, Felix T. S. Chan², Alain Y. L. Chong² ¹City University of Hong Kong, China

²Polytechnic University of Hong Kong, China

In this study, an attempt has been made to investigate the connectivity strength of employee perception on the successful implementation of business-IT alignment. To be specific, we first justify and verify the connection between several employee perceptions and business-IT alignment through hypothesis testing, and then measure the relative importance of each perception onto business-IT alignment via neural network computation. Our findings suggested that perceived employee communication has the strongest relationship with business-IT alignment, followed by employee knowledge and employee trust. Specifically, employee communication and knowledge are two major perceptions that affect the success of the business-IT alignment.

New Insight into Technology Licensing Strategy and Innovation Performance: Evidence from Chinese Latecomers in High-tech Industries

Yang Yang Zhao¹, P.K. Wong¹, A. M. Subramanian¹, C. C. Hang¹ ¹National University of Singapore, Singapore

As a catalyst for endogenous technological change, inward technology licensing can improve firm's innovation performance. This paper investigates the effect of learning by licensing and strategic choice of technology licensed in on subsequent innovation performance. We extend the inward technology licensing strategy to the latecomer context, addressing two critical factors: (1) number of licenses and (2) age of technology licensed in. We hypothesize about the relationship of the licensee's innovation performance with number of licenses and age of technology licensed in, as well as the moderating effect of the licensee's absorptive capability. Based on a sample of 154 Chinese firms from four high-tech industries, empirical evidence is found to support our arguments.

Functional Semantic Retrieval for Effects Knowledge Base

Hongtao Wu¹, Jinling Zhang¹, Jianhong Ma¹, Runhua Tan¹ ¹Hebei University of Technology, China

For resolving a technical problem in innovative design, designers usually try to find the appropriate effects relevant to the required function from effects knowledge base. So it is very important to retrieve effect in terms of its function. This paper explores ontology-based functional semantic retrieval for effects knowledge base. To tackle the insufficient reasoning ability of functional representation of "Verb + Noun", the functional semantics of effects is represented as [input flow list, action verb, output flow list]. Thus, the chains of effects are automatically built based on ontology reasoning to support complex functional design. Also, functional ontology is used to expand the functional keywords in order to provide a variety of retrieval cues and trigger design inspiration. Using the functional semantic retrieval, designers obtain the lists of effects or effects chains relevant to the required function, which greatly widen the solution space and increase opportunities for product innovation.

Constructing a Dynamic Evaluation Model for Corporate Diversification — The Thin-film Solar Cell Chang-Lin Yang¹, Rong-Hwa Huang¹

¹Fu Jen Catholic University, Taiwan

This study focuses on thin-film solar cell investment in the green energy industry, collecting and screening key factors of dynamic evaluation and presenting them to experts for modification. This evaluation model comprises three stages, namely planning, setup and import, with dimensions such as macro environment, group resource, supply chain, market, technology, equipment, raw material and finance being used to help operators evaluate the enterprise resource situation and decrease the input failure factor.

A Study of Inter-firm Network and Knowledge Integration Impact Mechanism on Absorptive Capacity

Zhigang FAN¹, Shuai GENG², Xiaoying PENG

¹Hangzhou Normal University, China

²Zhejiang University City College, China

For local enterprises which Integration into the global manufacturing network, the importance of using external information has been increasingly paid attention by scholars. This paper propose and test a model of how interfirm network effect firm's absorptive capacity. Using data of manufacturing firms, the results indicate that Network centrality and size of network have significant positive effects on potential absorptive capacity of enterprises; the strength of network ties was no significant positive impact potential absorptive capacity of the enterprise. The empirical results suggest that the potential absorptive capacity has mediating effects on the relationships between firm network and firm's realized absorptive capacity. In addition, coordination knowledge integration mechanism has moderation effects on the relationships between firm's potential absorptive capacity and realized absorptive capacity.

Adoption of Hierarchical Structure for Web Document Analysis in Knowledge Management System Rozlini Mohamed¹, Junzo Watada²

¹University Tun Hussein Onn Malaysia, Malaysia ²Waseda University, Japan

The objective of this paper is to analyze a web structure by means of using evidential reasoning to logical hierarchy structure. During the searching on the web, the search engine will return a set of web documents. But some web documents do not fit what we are looking for. The targeted documents are called relevant document, and the rests are irrelevant documents. Our focus is placed on the web document structure and link analysis. The web documents are grouped in an appropriate label and organized in logical hierarchy structure. The theorems proposed by Watada will employed to analyze the value of concepts or events in logical hierarchy structure according to belief and plausibility functions. From these values "influence events" can be determining when an irrelevant document is included in the web document about Tourism Management.

Activities and Problems in New Product Development Process in the Networking Industry - A Case of Different **Business Models**

Min-Sun Wuang¹, Shu-Min Chiang¹ ¹Fu Jen Catholic University, Taiwan

Facing intensive changes in the external environment in a globally competitive market, as well as rapid technological changes and varied consumer demands, enterprise survival has become an important topic. Firms should focus on developing products that are higher quality and more reasonably priced than those of competitors, to increase their profits and establish a competitive advantage to satisfy and fulfill customer needs, making new product development an important topic for discussion. This study classified business models into two types, OBM and ODM, and classified four stages of new product development, Proposal and Planning stage, Product Development stage, Trial Run Planning stage, and Mass Production stage. This study examines networking firms in Taiwan using six case studies, to identify the representative activities during each NPD stage, such as product feasibility evaluation and product proposal establishment, as well as project team member determination/project milestone establishment and development budget estimation during the proposal and planning and product development stages, EVT proceeding in the product development stage, DVT proceeding and PVT proceeding in the trial run planning stage, and customer PO acceptance, shipment delivery and project final result survey in the mass production stage, and each activity will undoubtedly encounter different marketing, product development and process development problems.

A Case Study on the Importance of Knowledge Management in Creative Product Development

Poh Kiat Ng¹, Nurul Izah Anuar¹ ¹Multimedia University, Malaysia

Knowledge management (KM) initiatives on innovation and product quality have developed a whole new level of strategy and competitive advantage for many industries. However, researchers believe that although employee motivation in knowledge sharing is important, it becomes a neglected issue. The key issue here is that employees should realize that KM initiatives are linked very strongly to new product development (NPD). KM involves creativity and knowledge creation which are both important factors when it comes to addressing concerns connected with the product life cycle during the design phase. Therefore, the aim of this study is to examine the importance of KM in NPD with a special emphasis on facets such as creativity and product development performance seeing as these two factors are specified at the design stage of a product life cycle. For this study, a survey analysis was carried out and analyzed using multiple linear regression analysis.

Improving a Model for New Service Development

Alireza Sheikhzadeh¹, Hamed Heidari¹ ¹Amirkabir University of Technology, Iran

The new service development (NSD) process has become vital to survive in highly competitive service sectors. This research suggests a methodology for the New Service Development process, aiming at the correct systematic approach of Quality Function Deployment (QFD) and target-costing in cost management. QFD and target-costing are complementary processes, because while one allows the identification of where cost reduction could be achieved, the other shows the target to be achieved to guarantee the long-term profitability plan of a company. In order to do that, Factors considering server's aspect of action are defined in a group of five as Service Package, and the outputs understood by customers are grouped as Customer-Desired Performance (CDP). The final aim of this model is to reconcile these two aspects having in mind the importance of voice of customer and

firm's benefit which are respectively interpreted as worth and value.

HSR Buying Behavior Modeling-Taiwan High Speed Railway Case

Hsiao-min Chuang¹, Chihpeng Chu², Yu-tzeng Lin³ ¹St. Mary's Medicine, Nursing and Management College, Taiwan ²National Dong Hwa University, Taiwan

³Taiwan Tourism & Hospitality Management College, Taiwan

This study identifies the consumer behavior by adopting the theory of planned behavior and the consumer logistics theory to model Taiwan High Speed Railway consumers' buying behavior. Through 242 effective questionnaires collected and Structural Equation Model analysis adopted, the authors conclude: 1. Trust significantly affects the perceived behavior control, the subjective norm and the attitude, furthermore the intention to ride HSR. 2. The influence of novelty is insignificant. 3. Safety/Cleanness is critical to affect both the efficiency and effectiveness, hence the intention to ride HSR. 4. Connectivity significantly affects efficiency, and the intention to ride HSR, but the impact on effectiveness is negligible. 5. Consumers with different riding purposes and distances respond to the price changes differently. The study concludes with strategic suggestions presented to THSRC for better marketing performance.

An Approach of Quality Management in the Small Business **Environment of South Africa**

Bingwen Yan¹, Li Zhang¹ ¹Cape Peninsula University of Technology, South Africa

Under the recent global worldwide economic crisis, small business enterprises (SBEs) are considered to be a major force behind the South Africa's economy. Regarding the strategy of quality management, probably the most serious constraint of SBEs is that the management is often constantly under time pressure, usually dealing with the urgent staff and operational matters. Quality management does not form the strategic basis of SBEs, which impacts on their sustainability as business enterprises. Thus, an effective quality management strategy is crucial to the sustainability of SBEs. This study proposed a quality strategy model by applying Plan-Do-Study-Act (PDSA) cycle for SBEs. A quantitative research paradigm was applied in the research. Cronbach's Alpha was utilised to test the reliability of each component of the model. The study results indicate that the proposed quality strategies can be implemented effectively by SBEs to ensure their sustainability.

Session	Decision Analysis & Methods (4)
Date	Thu, 8 Dec
Time	11:00 - 12:30
Room	Venus I
Chairs	Usha Ananthakumar, Feng-Chia Li

Genetic Algorithm for the Project Scheduling Problem with Fuzzy Time Parameters

Yilun Huang¹, Yongyi Shou¹, Linda Zhang² ¹Zhejiang University, China

²IESEG School of Management, France

It is essential to allocate scarce resource and schedule the activities effectively so as to improve the project performance. Due to inherent uncertainties of the environment and activities, a mathematical model with fuzzy time parameters is adopted for the resource-constrained project scheduling problem. A genetic algorithm based on a fuzzy parallel schedule generation scheme is proposed. Two schemes of fuzzification are adopted for activity durations. Computational tests show that triangular fuzzy time parameters would be preferred.

Detection and Improvement of Deficiencies and Failures in Public- Transportation Networks using Agent-Enhanced Distribution Data Mining

Eugene Levner¹, Avishai Ceder², Amir Elalouf³, Yuval Hadas³, Dvir Shabtay⁴ ¹Ashkelon Academic College, Israel

²Technion-Israel Institute of Technology, Israel

³Bar Ilan University, Israel

⁴Ben-Gurion University of the Negev, Israel

The main goal of this paper is to develop a general methodology for both pinpointing the weak elements of public transportation (PT) systems and finding least-cost solutions for improvements. The methodology is based on network routing, scheduling, and real-time control algorithms. These algorithms detect deficiencies and failures of the PT network and in operations planning. The main practical objective and challenge of this work is to provide a decision-support system for the prognosis and detection of the deficiencies of the PT network and measures required to their remedy. The system is based on off- and online algorithms and methods associated with multi-agent systems.

Forecasting the Exchange Rate between ASEAN Currencies and USD

Tien-Chin Wang¹, Su-Hui Kuo¹, Hui-Chen Chen²

¹National Kaohsiung University of Applied Sciences, Taiwan

²Kansai University, Japan

As the US has growing financial ties in Southeast Asia, how to accurately predict the ASEAN currencies becomes more and more important. This study applied the GM (1,1) model [6,9,10,11] to predict the exchange rate between the SGD and USD, IDR and USD, THB and USD, MYR and USD and PHP and USD from Jan 2002 to Feb 2011.The results show that the average accuracy of the forecasting model exceeds 99.38%.

Pricing Annuity Insurance Integrating Mortality Improvement Risk, Interest Rate Risk, Insolvency Risk and Insurance Demand

Hong Mao¹, Krzysztof M. Ostaszewski², Yuling Wang³ ¹Shanghai Second Polytechnic University, China ²Illinois State University, United States ³Shanghai University of Finance and Economics, China

In this paper, we discuss the pricing of annuity insurance. We emphasize how to consider the mortality risk in pricing model and at the same time, integrate interest rate risk, insolvency risk and insurance demand. The results of our analysis show that it is beneficial to both of consumers and insurers if considering the factor of mortality improvement in pricing of annuity insurance.

Possibilistic Programming Decision Making in Modality Perspective

Arbaiy Nureize¹, Junzo Watada¹

¹Waseda University, Japan

The decision making faces a number of inherent uncertainties. The uncertainty of parameters of a model comes from vagueness and ambiguity included in the model structure and information. In this paper we present the decision model from the perspective of possibilistic programming to treat properly uncertainties in the decision making. The proposed concept plays a pivotal role in building fuzzy linear programming model, which is exposed with various types of uncertainties. The treatment of vagueness and ambiguity is given and a modality approach is used to solve the fuzzy linear program. An illustrative example explains the proposed model.

Towards a Lifecycle-oriented Planning of a Platform Portfolio

Sebastian A. Schenkl¹, Robert Orawski¹, Fatos Elezi¹, Udo Lindemann¹ ¹Technische Universitat Munchen, Germany

Product platforms are an approach of variant management which is widely used in industry. During the planning process of a platform portfolio, the scope for development of derivative products based on a platform is limited to some extent. In this paper, we address temporal aspects of a platform portfolio. The task during the planning process is to find an optimal compromise of the scheduling of products and platforms with their revisions. To gain a decision-making ability about the future platform portfolio, dynamic changes during the lifecycle of product platforms must be anticipated. That can be achieved by forecasting changes and variations of a company's context and within the own organization and to analyze its impact on the platform portfolio.

Session	Decision Analysis & Methods (5)
Date	Thu, 8 Dec
Time	13:30 - 15:00
Room	Venus I
Chairs	Szu Hui Ng, Ronnachai Sirovetnukul

About Combined Non-Expansive and Potentially Expansive Properties of a Class of Self-Maps in Metric Spaces Manuel De La Sen¹

¹University of Basque Country, Spain

This paper investigates self-maps which satisfy a distance constraint in a metric space which mixed point-dependent non-expansive properties, or in particular contractive self-maps, and potentially expansive properties related to some distance threshold. In this way, the self-map may be expansive for small distances and contractive for large ones. The above mentioned constraint is feasible in certain real -world stability problems of usefulness as when discussing ultimate boundedness in dynamic systems.

A Preliminary Study About the Application of Multicriteria Decision Aid to the Evaluation of the Road Projects' Performance on Sustainable Safety

Renaud Sarrazin¹, Yves De Smet² ¹Universite Libre de Bruxelles, Belgian Road Research Center, Belgium ²Universite Libre de Bruxelles, Belgium

Since 2002, improving road safety has been a main issue in policies for transport and mobility in Europe. In Belgium, the Federal Commission for the Road Safety had defined an objective of reducing the number of deaths on Belgian roads to 500 by 2015. Then, this research aims to improve road safety on Belgian roads by developing a multicriteria decision aid model for the evaluation of sustainable road safety on secondary rural roads. In this preliminary study, we describe the approach which led us to the development of the first elements of our methodology. At first, we define the set of criteria that structures the problem, and then, we apply them to a specific case study - the redevelopment of the N243a. Finally, we analyze the results to prove the complexity of this type of problems and to point out the usefulness of a multicriteria decision aid methodology to resolve them.

Exploration of Product Value - Characteristic Relationship: Partial Least Squares Path Modeling for Product Design and Development

Chathura Withanage¹, Taezoon Park¹, Truong Ton Hien Duc², Hae-Jin Choi³ ¹Nanyang Technological University, Singapore

²Singapore Institute of Manufacturing Technology, Singapore ³Chung-Ang University, South Korea

Estimating the product Value-Characteristic (VC) relationship is the most important task for deciding on the mix and the levels of product attributes of a new product targeted at a well established product market segment. In this paper, Partial Least Square Path Modeling was used to investigate the VC relationship of the US Sedan car market sales data from 2008 to 2010. A two-phase case study was conducted to achieve two primary objectives of empirical validation of Customer Revealed Value (CRV) as an indicator of the value generated by product characteristics; and formulation of a simplified VC model with most influencing variables. CRV was successfully validated, and it was used to get the simplified model with an improved goodness of fit value. In addition, CRV was used for the first time to explore the VC relationship of a market segment with latent variables in this study.

Comparison between Regression Analysis and Artificial Neural Network in Project Selection.

Oludolapo Olanrewaju¹, Adisa Jimoh¹, Pulek Kholopane²

¹Tshwane University of Technology, South Africa ²University of Johannesburg, South Africa

A common problem faced by managers is that of project selection, to decide which project out of the lots should be undertaken. This paper aims at comparing results of the application of two approaches-respectively regression analysis, a parametric method and artificial neural network, a non-parametric technique. To demonstrate these methods, the models were illustrated using Oral, Kettani and Lang's data on 37 R&D projects for their success. From statistical analysis, it was discovered that artificial neural network showed superiority to deciding how projects should be ranked and selected.

Application of TOPSIS Method for Evaluating the Temporal Dimensions of Marand City in Urban Design

Maliheh Hashemi¹, Mehdi Amiri-Åref² ¹Tabriz Islamic Art University, Iran

²Mazandaran University of Science & Technology, Iran

In this paper, a multi-criteria decision making problem to evaluation of the temporal dimension for a number of places in Marand City, Iran by TOPSIS method is implemented. Places with higher score and lower

design are introduced. It is a vital decision for the urban managers.

score, respectively, regarding to the temporal dimension in urban

Production and Raw Material Ordering Management for a Manufacturing Supply Chain with Uncertainties

Wei Xu¹, Dongping Song¹, Michael Roe¹

¹University of Plymouth, United Kingdom

This paper considers the problem of joint production and raw material ordering management in a manufacturing supply chain with uncertain supply (due to information quality) and uncertain production (due to product quality). Several strategies are presented to improve the supply chain performance. Simulation method is used to compare the strategies with a case company's existing practice using realistic data. The scenario analysis demonstrates that relative merits exist for different strategies. It appears that safety production and safety ordering are necessary as the level of uncertainties increases.

Features Selection Approaches Combined with Effective Classifiers in Credit Scoring Chia-Ching Lin¹, Chin-Chih Chang², Feng-Chia Li², Tzu-Chin Chao³

¹Yu Da University, Taiwan

²Jen-Teh Junior College of Medicine, Nursing and Management, Taiwan ³Hwa Hsia College, Taiwan

With the rapid growth in the credit industry, credit scoring models are being widely used for credit admission evaluation. Credit scoring has been regarded as a critical topic, with its related departments striving to collect huge amounts of data to avoid making the wrong decision. Finding effective classificatory models is important because it will help managers make an objective decision instead of them having to rely merely on intuitive experience. This study proposes three approaches which combine two well-known classifiers, namely, K-Nearest Neighbor (KNN) and Support Vector Machine (SVM), to find the best hybrid classifier combination. Features selection retains sufficient information for classification purposes. Different credit scoring combinations are constructed by selecting features with three approaches and two classifiers. Two credit data sets from University of California, Irvine (UCI) are chosen to evaluate the accuracy of various hybrid features selection models. KNN abd SVM classifiers combine with linear discriminate analysis (LDA), Rough sets (RST), and F-score approaches as a features preprocessing step to optimize features space by removing both irrelevant and redundant features. In this paper, the procedures of the proposed approaches are described and then evaluated by their performances. The results are compared and nonparametric test will be performed to show if there is any significant difference between these models. Performances of the F-score approach combined with effective classifiers are brilliant among the two data sets. The result of this study suggests that the hybrid credit scoring approach is mostly robust and effective in finding optimal subsets and is a promising method in the field of data mining.

Session	Manufacturing Systems (1)
Date	Thu, 8 Dec
Time	15:30 - 17:30
Room	Venus I
Chairs	Zhaotong Lian, Jannes Slomp

Integrated Optimisation of Facilities Layout and Material Handling System

Dhamodharan Raman¹ ¹CQUniversity, Australia

The existing methodologies to independently optimise facilities layout design and material handling system (MHS) are mainly based on minimising the material handling cost and acquisition cost and have neglected several critical variations inherent in a manufacturing system. This is despite the fact that the inherent variability causes an accumulation of work-in-process (WIP) at the various stages of production which eventually affects competing strategies of a manufacturing enterprise such as time, cost and quality. Therefore, an integrated methodology that incorporates the manufacturing variability and concurrently optimises the layout design and MHS is discussed in this paper. Queuing model is utilised to model the manufacturing system variations and genetic algorithm has been implemented to solve the integrated optimisation problem. It is also demonstrated that the proposed integrated optimisation approach can significantly improve a production system with respect to total travelling time, total WIP in the system, utilisation and quantity of material handling equipment and required area.

Model of Spine Configuration Assembly Line Design for a Product Family

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A Product family usually consists of common subassemblies and variant subassemblies which expose a modular product structure. This paper presents a model of spine configuration assembly line that is designed to connect some sub-assembly lines as the modular structure. Based on such structure, the approach of designing the assembly line takes benefit from the commonality of components and assembly operations to reduce complexity of variants assembly processes. The proposed model is formulated in linear and non-linear programming formulations that minimize total cost of assembly line operation. Example data problem is used to show the application of the model and yields spine assembly lines configuration of a product family.

Multi-objective Assembly Line Balancing Problem with Bounded Processing Times, Learning Effect, and Sequence-dependent Setup Times

Nima Hamta¹, Seyyed Mohammad Taghi Fatemi Ghomi¹, M. Hakimi-Asiabar¹, P. Hooshangi Tabrizi¹

¹Amirkabir University of Technology, Iran

This paper addresses multi-objective optimization of a single-model assembly line balancing problem where the processing times of tasks are unknown variables and the only known information is the lower and upper bounds for processing time of each task. Three objectives are simultaneously considered as follows: (1) minimizing the cycle time, (2) minimizing the equipment cost, and (3) minimizing the smoothness index. In order to reflect the real-world situation adequately, we assume that the task time is dependent on worker(s) (or machine(s)) learning for the same or similar activity and also sequence-dependent setup time exists between tasks. Furthermore, a solution method based on the combination of two multi-objective decision-making methods, weighted and min-max techniques, is proposed to solve the problem. Finally, a numerical example is Prareto optimal solutions.

Optimization and Modeling of Turning Process for Aluminium - Silicon Carbide Composite Using Artificial Neural Network Models

R. Jeyapaul¹, S. Sivasankar¹ ¹National Institute of Technology, India

The major work elements of this paper are manufacturing of Metal Matrix Composites (MMC), Machining of MMC and Optimization and modeling of Machining parameters. The cast is produced through permanent moulding process for the mixing ratio of 15% SiC and 85% Al. A Taguchi's Orthogonal Array (OA) experiment is designed to carry out the machining operation. Four parameters, namely Tool materials, speed, feed and depth of cut are considered as factors. The output parameters are cutting power, cutting force, shear strength, surface finish and Material removal rate. The output responses are combined to have a single objective as multi response performance index (MRPI) and Manufacturer value function (MVF). ANN models are developed for mapping the relationship between parameters with MRPI and MVF.

The optimal process parameters are selected based on the output given by the ANN. The results of both functions are compared by using S/N ratio analysis.

A Framework for Evaluating Lean Implementation Appropriateness

Diogo Aurelio¹, Antonio Grilo¹, Virgilio Cruz Machado¹

¹Universidade Nova de Lisboa, Portugal

This paper focus on the key variables that limit the penetration ability of Lean's methodologies in industrial contexts, and thus should be considered prior to any Lean implementation. Based on a extensive literature review and experts focus group, it is presented a framework that organizes the main criteria to be considered and suggest a decision-making process in order to determine whether Lean methodologies should be implemented or not. The framework encompasses a holistic view that includes both a strategic and an operational dimension to be considered with a certain relative weight. The objective is to guide any decision maker through a process of evaluating whether Lean Management practices suit or not his organization's industrial context.

Measuring Efficiency of Production Lines Based on Maintenance Factors ; Using DEA

Sahar Abbasi¹, Hadi Shirouyehzad

¹Islamic Azad University, Iran

Efficiency measurement is always considered because of its importance in performance evaluation of organization. The purpose of This study is to assess efficiency of four concentrate production lines in Chadormalu Mining & Industrial Company within two consecutive years. Hence, Data Envelopment Analysis (DEA) model is used as a quantitative analytical procedure and ends to actual standards of efficiency. In this paper consider various indicators of Maintenance as inputs as well as outputs, and the production lines are thought of Decision Making Units (DMU) that classified either as efficient or inefficient. Changes in inputs or outputs of any DMU can alter its classification, DMU change in inputs or outputs can change the DMU status to inefficient and vice versa. Therefore, Sensitivity Analysis is used to analyze how any decrease in inputs can raise the efficiency of inefficient parts. This way, those exhibiting best practice can be identified and will form an efficient frontier.

Comfort Study of Work Environment of Apparel Industry

Wathavana Vithanage Randika Kosala¹, Nimesha Vilasini¹, Janaka Gamage¹ ¹University of Moratuwa, Sri Lanka

Diminution of workers' efficiency and increase of health and safety hazards are among the topmost problems faced by present manufacturing industry. Therefore manufacturing industries are continuously exploring new avenues to improve factors that affect workers' efficiency, health and safety while improving the overall productivity. The main objective of the research was to address such problems by introducing ergonomically sound work environment and practices through action based case study. This paper elaborates how thermal comfort, design of work places and practices influence the overall productivity of an apparel manufacturing factory in Sri Lanka. Data related to design of work environment and human comfort were gathered by means of a questionnaire survey and on-site experimental observations. Then the data were analysed by comparing them with the industry standards and theories of ergonomics. Based on the resulting conclusions an action plan was developed and recommended solutions for the identified issues.

Hybrid Solving Algorithm for Complex Machine Scheduling Problem

J. Behnamian¹, Seyyed Mohammad Taghi Fatemi Ghomi¹, M. Zandieh² ¹Amirkabir University of Technology, Iran

²Shahid Beheshti University, Iran

In this research, we make use of one of the multiple objective decision-making methods, min-max technique, to develop a new hybrid metaheuristic for solving sequence-dependent setup time hybrid flowshop scheduling problems with consideration of two performance measures, namely Cmax, and sum of the earliness and tardiness, simultaneously. The proposed hybrid approach comprises three components: an initial population generation method based on an ant colony optimization (ACO), a simulated annealing (SA) as an evolutionary algorithm employs certain probability to avoid becoming trapped in a local optimum, and a variable neighborhood search (VNS) which involves three local search procedures to improve the population.

Session	Quality Control & Management (1)
Date	Thu, 8 Dec
Time	11:00 - 12:30
Room	Venus II
Chairs	Amirhossein Amiri, Hendry Raharjo

Developing a Framework for Six Sigma in Financial Service Institutions - Empirical Evidence from Expert Interviews Ayon Chakraborty¹, Michael Leyer²

¹Queensland University of Technology, Australia

²Frankfurt School of Finance & Management, Germany

Six Sigma is considered to be an important management philosophy to obtain satisfied customers. But financial service organisations have been slow to adopt Six Sigma issues so far. Despite the extensive effort that has been invested and benefits that can be obtained, the systematic implementation of Six Sigma in financial service organisations is limited. As a company wide implementation framework is missing so far, this paper tries to fill this gap. Based on theory, a conceptual framework is developed and evaluated by experts from financial institutions. The results show that it is very important to link Six Sigma with the strategic as well as the operations level. Furthermore, although Six Sigma is a very important method for improving quality of processes others such as Lean Management are also used. This requires a superior project portfolio management to coordinate resources and projects of Six Sigma with the other methods used. Beside the theoretical contribution, the framework can be used by financial service companies to evaluate their Six Sigma activities. Thus, the framework grounded through literature and empirical data will be a useful guide for sustainable and successful implementation of a Six Sigma initiative in financial service organisations.

Improve Burnishing Formation Yield Applying Design For Six Sigma

Jianjun Wu¹, Yizhen Wang¹, Qizhong Zhang¹, Pengpeng Huang¹ Jiangxi University of Science and Technology, China

In order to overcome the drawback of traditional optimize only focus on part parameters and low efficient, this paper explores a new Design for Six Sigma(DFSS) integrating Artificial Neural Network approach in optimizing burnishing formation process quality and yield. The experiments show that DFSS-Neural based on LCC method is an effective tool to improve the roller burnishing yield in machining.

Robust Monitoring of Process Mean Vector in Female Shrouded Connector Production: An Experience in Malaysia Rohayu Mohd Salleh¹, Maman Djauhari¹

¹Universiti Teknologi Malaysia, Malaysia

We present a robust approach in monitoring the process mean vector of female shrouded connector production experienced in a company in Malaysia. First, we propose a new stopping rule in data concentration process of FMCD to reduce its computational complexity and then use it in Phase I to estimate the process parameter needed during Phase II operations. Interesting result such as based on multivariate capability index CpM will be reported.

Research of Relationship between Tolerance Allocation and Machine Movement Chain

Jiping Lu¹, Shuiyuan Tang¹, Guanghe Lu², Hao Song¹ Beijing Institute of Technology, China

²CNGC Shanxi Diesel Engine Industry Co. Ltd, China

Tolerance allocation is one key to designing and manufacturing of machine equipments. According to the assembly process of tubular-structure, this paper analyzes motion modes to achieve tubular-structure loading. In term of assembly tolerance of tubular-structure, a tolerance model to guide structure design of loading equipment is formulated. Based on tolerance analysis of each motion mode, the maximum available size of the tubular-structure is calculated under different linear rolling guide, and the minimum available size of the interior rail in the box is calculated under different ball screws, trapezoidal screw threads, worm and worm gears. To meet the tolerance of tubular-structure assembly, machine movement chains are defined.

Implementation of Overall Equipment Effectiveness in Wire Mesh Manufacturing

Ratapol Wudhikarn¹ ¹Chiang Mai University, Thailand

This study presents the implementation of overall equipment effectiveness (OEE) at a small enterprise manufacturing wire mesh in the developing country of Thailand. This company had never established any performance measurement before. Therefore, an appropriate indicator was elaborately selected for the case study, and OEE was chosen. OEE is employed as a simple indicator, but it is still an effective method for analyzing the efficiency of a single machine and an integrated machinery system. The case study of OEE was carried out from set-up stage to full implementation. Several processes were carried out to establish the OEE indicator. OEE helped the company identify the primary problems concerning the availability rate and performance efficiency. The management made the decisions by relying on OEE results and its details, and mandated the elimination of the root causes of breakdown losses and speed losses. Finally, after six months of full implementation, OEE performances improved by over 60 percentages, since availability rate and performance efficiency were improved over 75 percentages, and quality rate was maintained at the same level.

Strategic Management of the Triple Constraint Trade-off

Dynamics - a Polarity Management Approach C. Jurie Van Wyngaard¹, H.C. Pretorius¹, Leon Pretorius² ¹University of Johannesburg, South Africa ²University of Pretoria, South Africa

The project management body of knowledge (PMBOK) endorses that every project is governed by the triple constraint, which reflects a framework for evaluating competing demands. This paper extends the benefits of polarity management to the triple constraint in project management through an integrated framework. The aim of this paper is to indicate that the integrated framework may provide a feasible negotiation mechanism to facilitate optimum trade-offs between, and exploitation of, the key triple constraint variables as a function of the project higher purpose.

Session	Project Management (1)
Date	Thu, 8 Dec
Time	13:30 - 15:00
Room	Venus II
Chairs	Leon Pretorius, Norbert Trautmann

Total Productive Maintenance in a Semiconductor Manufacturing Firm: An Empirical Analysis

Kam-Choi Ng¹, Gerald Guan Gan Goh², Uchenna Cyril Eze³

¹Infineon Technologies, Malaysia

²Multimedia University, Malaysia

³Monash University Sunway, Malaysia

Total productive maintenance is claimed to play a key role in improving maintenance and engineering performance in firms. With the use of TPM, manufacturing organizations would be able to reduce wastage and enhance productivity. This study is conducted in a large semiconductor manufacturing firm in Malaysia and analyses the secondary data obtained from the total fabrication monitoring system using paired samples t-test. The results indicate that all the performance measures indicate significant improvements after TPM implementation which lends support to the claim of the effectiveness of TPM. Hence, manufacturing firms need to seriously weigh the pros and cons of TPM implementation and take the necessary steps needed to effectively deploy TPM to enjoy better machine performance rates for increased productivity levels.

Innovation Project Portfolio Management: the Case of **Philips Research**

Sergey Filippov¹, Herman G. Mooi¹

¹Delft University of Technology, Netherlands

Project Portfolio Management (PPM) has emerged as a central tool of multi-project governance in modern organizations. Increasingly, PPM approaches are being applied not only to "regular" projects, but also to innovation projects and innovation management. Companies strive to achieve their strategic goals and maximize their investments in innovation by improving their organizational innovation capabilities and project management. The paper presents a case study of project portfolio management at Philips Research, a research unit of Royal Philips Electronics Inc., a multinational electronics company. We examine the initial conditions and main motivation to implement PPM; then we study characteristics and specifics of managing a portfolio of innovation and research projects in Philips Research. Further, we elaborate on the future prospects of PPM in the organization.

Project Risk Management: a New Approach

Stefan Creemers¹, Erik Demeulemeester², Stijn Van de Vonder² ¹IESEG School of Management, France

²K.U.Leuven, Belgium

The goal of project risk management is to provide insight into the risk profile of a project as to facilitate decision makers to mitigate the impact of risks on project objectives such as budget and time. A popular approach to determine where to focus mitigation efforts, is the use of so-called ranking indices. Ranking indices allow the ranking of project activities (or risks) based on the impact they have on project objectives. A distinction needs to be made between activity-based ranking indices (those that rank activities) and risk-driven ranking indices (those that rank risks). Because different ranking indices result in different rankings of activities and risks, one might wonder which ranking index is best? In this article, we provide an answer to this question. Our contribution is threefold: (1) we set up a large computational experiment to assess the efficiency of ranking indices in the mitigation of risks; (2) we develop two new ranking indices that outperform existing ranking indices and (3) we show that a risk-driven approach is more efficient than an activity-based approach.

Exploring Close-optimal Solutions for the Time Constrained Scheduling Problem in Project Management Christos Kiriklidis¹, Konstantios Kirytopoulos², Elena Rokou²

¹University of Aegean, Greece

²National Technical University of Athens, Greece

This paper presents a new approach for the Time Constraint Project Scheduling Problem (TCPSP). A two stage heuristic algorithm was developed for this problem. During the first stage a genetic algorithm using as fitness function, a function composition of max resource usage and the differences between actual and desirable resource usage, is executed to get a set of solutions. The second stage consists of choosing the best chromosomes and moving the solution's set start times +/-1 to randomly generate another set of solutions. Experimental results of the two stage approach are presented and compared to the single genetic algorithm results.

Application of Real Options in Project Portfolio Selection Chengchao Wang¹, Yongyi Shou¹ ¹Zhejiang University, China

The real options theory has received widespread attention for its response to environmental uncertainty and managerial flexibility. The paper attempts to apply real options theory in project portfolio selection so as to maximize the option value of the selected project portfolio. On the basis of analyzing major types of real options and their evaluation, it is found that real options are suitable for project selection, and the compound options are more in line with real-world project portfolios.

Risk Factors Influencing Time and Cost Overrun in Multiple D&B Projects in Malaysia: a Case Study

Ramanathan Chidambaram¹, Narayanan Sambu Potty¹, Arazi Bin Idrus¹ ¹Universiti Teknologi Petronas, Malaysia

Currently Design and Build (D&B) has gained popularity in the construction industry due to its attractive financial aspects. The development projects are implemented by D&B because of its special nature, crucial time requirements and size. Many D&B projects ended in the hands of contractors lacking knowledge on the other major constraints of this procurement method. They are basically committed by judgement and inadequate experience and unable to execute the project within the agreed time and price. The risk is more while committing to multiple simultaneous projects. This paper is a part of the research involving seven (7) case studies on actual multiple D&B projects. Site visits and project documents provided the core data for the case studies. The characteristic background of each project is presented with contractor's, consultant's and owner's opinions. From the collected information, data on the factors influencing time and cost overruns were summarized. The researcher's opinions on each case study are provided in conclusions.

Session	Project Management (2)
Date	Thu, 8 Dec
Time	15:30 - 17:30
Room	Venus II
Chairs	Ayon Chakraborty, Anil Varma

Do Project Managers Need an Operations Research Support Indeed?(A Survey on Polish Project Managers Attitude towards Operations Research Methods and Tools) Tomasz Blaszczyk¹

¹University of Economics, Poland

Project Management methodology contains a set of formal tools based on Operations Research background. Most of them are expected to be well known to project decision-makers from handbooks and professional or scientific papers. The aim of this paper was to present results of the survey made on the group of professional project managers and project-related decision-makers. In this survey their consciousness, need, and field of applications of operations research tools in project management area was investigated.

Dynamic Fuzzy Comprehensive Evaluation of Contract Management in Project Department

Yunna Wu¹, Yong Huang¹, Wenjun Chen¹ ¹North China Electric Power University, China

Contract management is the core work of project management, the effectiveness of management directly reflects the integral effect of project management. Considering the dynamic characteristic of contract management, the paper introduces dynamic fuzzy sets theory into this paper, and establishes a dynamic fuzzy comprehensive evaluation model of projects department contract management. A case study is presented to validate the model. This model can not only reflect the fuzzy degree of the index, but also reflect the changing trends of the contract management performance through dynamic comparison in different management stages. With the model, we can clear the contract management performance level, discovery existing problems more scientifically, and provide corresponding suggestions for the next stage of the contract management.

Particle Swarm Optimization for Preemptive Project Scheduling with Resource Constraints

Fei Li¹, Changtao Lai¹, Yongyi Shou¹ ¹Zhejiang University, China

This paper studies preemptive project scheduling with resource constraints. We developed a particle swarm optimization (PSO) method based on two different particle representations to solve the problem which permits each activity to preempt at most once. Computational experiments are provided to investigate the performance of PSO-based approaches and to compare two representations. The result shows that preemption helps to reduce project duration and the PSO method we developed can handle preemptive project scheduling efficiently.

An Optimization Model for the Control of Complex Turnkey Projects in Plant Engineering Egon Mueller¹, Ralph Riedel¹, Manuela Krones¹, Henrik Vay²

¹Chemnitz University of Technology, Germany

²MAN Diesel & Turbo SE, Germany

Turnkey plant projects are endeavors which are characterized by high complexity and system dynamics. The application of special methods and models in the project management processes of planning and monitoring & controlling has become a competitive advantage in turnkey plant business. Special attention has to be given to the identification and evaluation of changes and disturbances as those could have severe impacts on the project's objectives. The selection and implementation of proper control measures becomes crucial to ensure successful projects. In this paper a novel approach for modeling the interdependencies of engineering activities is presented. The approach particularly addresses planning information and changes that will limit the effects of control measures in the case of possible delays. The modeling approach offers decision support by providing a holistic basis for the evaluation of changes.

Team Communications and Academic R&D Performance: A Case of National Telecommunication Program of Taiwan Chia-Liang Hung¹, Jerome Chih-Lung Chou², Shan-Jan Kuo¹

¹Chi-Nan International University, Taiwan ²Hwa-Hsia Institute of Technology, Taiwan

This research evaluates Taiwan National Telecommunication Program using the DEA approach and analyzes impacts of team communications on R&D performance by establishing a SEM relationship. The results show that team communications are highly correlated with the R&D performance. For the high-scored projects, they have the internal communication patters with a higher frequency of meeting but a shorter time-consumption dialogue, a uniform distribution of regular meeting, a lower hierarchy to meet with the project leader, a well-managed channel to access accumulative expertise, and an open forum for communication. They also have the external communication patterns with a gatekeeper bridging information inward and outward, a lower frequency of time-consumption external sourcing, and a higher frequency of external cooperation, referencing, learning, and benchmarking. The research will contribute guidelines for effective project management to team leaders and program sponsors.

Prioritizing Activities on a Building Site Project

Luciana Alencar¹, Adiel Almeida¹, Caroline Mota¹

¹Federal University of Pernambuco, Brazil

The increase in competitiveness in the construction industry has been compelling companies to offer better quality products that are completed on time. This is not an easy task. One of the essential aspects to be catered for so as to reach this aim is to engage on adequate planning, which involves prioritizing the activities to be carried out. This includes medium-term planning. During this stage, many aspects should be considered so that an adequate analysis can be made of activities that can be carried out, which do not cause problems for long-term planning. Therefore, this study presents a more structured decision-making model for medium-term project planning, such that the activities that can be carried out in the period of analysis can be prioritized in accordance with the aspects that the project manager considers most important. An application on a building site project is presented.

A Multi-Objective Optimization and Fuzzy Prioritization Approach for Project Risk Responses Selection

Ebrahim Rezaee Nik¹, Seyed Hessameddin Zegordi², Ahad Nazari³ ¹Tarbiat Modares University, Sadjad Institute of higher Education, Iran ²Tarbiat Modares University, Iran ³Shahid Beheshti University, Iran

Risk response development is the weakest part of the project risk management process; consequently many companies fail to gain the full benefits of risk management. This paper proposes an optimization model that integrates the project work breakdown structure, risk events, risk responses and their effects into a practical framework. This model minimizes total expected loss, which consists of four components: abatement actions costs, expected time loss, expected cost loss and expected quality loss. We use a fuzzy prioritization approach for calculating the coefficients of the objective function. The model can measure consistency index for the fuzzy pair-wise comparison matrix. An exact method and a heuristic algorithm are proposed in order to solve the model. Furthermore, a case study in power plant projects is presented to show the applicability and performance of the model.

A Serial Scheme for Minimizing the Duration of **Resource-Constrained Projects within Microsoft Project** Norbert Trautmann¹, Gianluca Brandinu¹

¹University of Bern, Switzerland

Microsoft Project is one of the most-widely used software packages for project management. For the scheduling of resource-constrained projects, the package applies a priority-based procedure using a specific schedule-generation scheme. This procedure performs relatively poorly when compared against other software packages or state-of-the-art methods for resource-constrained project scheduling. In Microsoft Project 2010, it is possible to work with schedules that are infeasible with respect to the precedence or the resource constraints. We propose a novel schedule-generation scheme that makes use of this possibility. Under this scheme, the project tasks are scheduled sequentially while taking into account all temporal and resource constraints that a user can define within Microsoft Project. The scheme can be implemented as a priority-rule based heuristic procedure. Our computational results for two real-world construction projects indicate that this procedure outperforms the built-in procedure of Microsoft Project.

Session	Supply Chain Management (4)
Date	Thu, 8 Dec
Time	11:00 - 12:30
Room	Jupiter I
Chairs	Mei Qi, Jun-Der Leu

Reverse Logistics: Implementation in the Industrial Sector of Ecuador

Arun Kumar¹, Christian Veloz¹, Roesfiansjah Rasjidin¹ ¹RMIT University, Australia

This paper discusses the reverse logistics operations and a sustainable industry in Ecuador. The research uses the Soft Systems Methodology (SSM) and builds a model by considering the key elements to undertake the implementation of reverse logistics in Ecuador. The model creates a taskforce which works with the companies to help them adapt reverse logistics to their current logistics processes. It also includes external variables such as political issues, environment constraints and social pressure. A holistic approach is given using systems thinking in order to incorporate all the aspects needed to implement reverse logistics in the industrial sector.

Performance-based MRO Service Contracts with Two Customer Classes

Niak Wu Koh¹, Roland Y. G. Lim¹

¹Singapore Institute of Manufacturing Technology, Singapore

As part of the paradigm shift in aerospace service contracts, a principal (e.g., an airline) now deals with only one agent (e.g., an aircraft integrator or Maintenance, Repair and Overhaul (MRO) service provider) - an agent can service any number of contracts. Due to the sporadic nature of unscheduled MRO, these integrators would stipulate a fee based on a detailed cost structure consisting of the amount of spares and effort required to service these packages. By doing so, the contractual value may be overpriced, thus making the provider less competitive, or underpriced, consequently incurring losses. This work aims to optimally value a service callocation. We conclude this work with a fill rate analysis on two customer classes to distinguish between high and low priority demands.

An Effective Heuristic for Yard Template Design in Land-Scarce Container Terminals

Mingkun Li¹, Shiying Li²

¹Shanghai University, The Hong Kong Polytechnic University, China

²*The University of Hong Kong, China* Due to limited storage space and heavy workload, container stacking in many Asian seaports is of high density. The method of yard storage template design, which effectively allocates yard space for incoming containers, is critical for utilizing yard storage resources and facilitating yard operations. This research studies the problem with a periodical vessel calling pattern that resource planning for berths and the yard area can be processed simultaneously in different hierarchies. It aims at optimally allocating slots to export containers in an area associated with a home berth achieving a space-saving template design. A two-phase solution method is proposed and an effective heuristic is developed to quickly decide the exact shape and location of yard clusters to be fitted into the template with a suitable order.

How the Effect of Country-of-Origin on Store Brand Moderates Customer's Affection-Conation Link toward Multinational Retailers

Yung-Hsin Chen¹, Shuo-Chang Tsai², Yi-Shuang Wu¹, Shu-Min Li¹ ¹National Cheng Kung University, Taiwan

²Asia Univeristy, Taiwan

Retailers as the down-stream end of international supply chain always face a challenge in product strategic decision about "standardization" or "adaptation" to appeal to local customers, as such retailer's store brand products come to the solution. Customers identify a brand with its origin, or country of origin (CoO). The introduction of store brand products brings out tangible benefits to consumers. Its usage spans consumers' demographic, socio-economic, and also psychological variables. However, empirical evidences in the research area of supply chain management are quite sparse. This study extends the conceptual models of CoO image proposed by Roth based on Fishbein's "the theory of reasoned action" to construct a modified framework with a purpose to examine how CoO effect on store brand moderate customer's affect and conations toward the international retailers. The moderating role of CoC effect on store brands in their relationships is the focus aiming to fill the gap of research.

Information Sharing in Supply Chain: Modeling the Barriers A. A. Pujara¹, R. Kant¹, M. D. Singh²

¹Sardar Vallabhbhai National Institute of Technology, India

²Motilal Nehru National Institute of Technology, India

Information sharing (IS) encompasses the sharing between downstream members of supply chain (SC) to share their demand information effectively and efficiently with upstream members of SC. The barriers which resist in the IS enablement of SC are known as Information Sharing Barriers (ISBs). The main aim of this paper is to understand mutual influence of ISBs using interpretive structural modeling (ISM) and to identify driving ISBs (ISBs that support other ISBs) and dependent ISBs (ISBs that are most influenced by others ISBs). It has been observed that ISBs 'Lack of top management commitment and Vision' has high driving power and low dependency.

Service Impact on Customer Demand and Member Profit in a Supply Chain

Rasul Jamshidi¹, Seyyed Mohammad Taghi Fatemi Ghomi¹

¹Amirkabir University of Technology, Iran

This paper analyzes the impact of provided services by the retailers and manufacturers for customers' demand and members' profit in supply chain. It focuses a supply chain structure with one manufacturer and a common retailer. The demands of customers depend on retailer price and service level. A game-theoretic framework is applied to obtain the equilibrium solutions for every entity in supply chain. In order to investigate the impact of service on the demand and supply chain members' profit, when the manufacturer is a leader, we derive and compare equilibrium solutions for the supply chain under three different scenarios. Theses scenarios are for the case that manufacturer and retailer do not provide any service to customers; the case that retailer provides service to customers; and the case that manufacturer provides service to customers. We compared the results from these three scenarios and proposed the best scenario for our problem.

Session	Supply Chain Management (5)
Date	Thu, 8 Dec
Time	13:30 - 15:00
Room	Jupiter I
Chairs	Qing Lu, R. Kant

The Resilience Paradigm in the Supply Chain Management: A Case Study

Ana Paula Barroso¹, Virgínia Machado¹, Virgilio Cruz Machado¹

¹Universidade Nova de Lisboa, Portugal

Supply chains are facing numerous changes that are contributing to increasing their complexity and vulnerability to disturbances. To survive, supply chains must be resilient. However, the specificities of each supply chain allied to the uncertainty environment in which they operate, do not allow to determine, with advance, which is the most appropriate strategy to mitigate the negative effects of a likely disturbance. To understand how some management strategies improve supply chain resilience to a disturbance, and how they influence supply chain performance, scenario analysis was used. A case study related to a Portuguese automotive supply chain is presented. Two strategies widely used to mitigate disturbance effects on supply chains were considered and six scenarios were designed. The scenarios differ in terms of presence or absence of a disturbance and a mitigation strategy. To evaluate the scenarios designed, two key performance measurements were defined.

Minimizing the Vulnerabilities of Supply Chain: A new Framework for Enhancing the Resilience

Umang Soni¹, Vipul Jain¹

¹Indian Institute of Technology Delhi, India

Today's globalized, leaner and just-in-time supply chains are more vulnerable to natural and man-made disasters. The business environment is continuously varying which produces risk and to manage this risk, it requires resilience. This paper proposes a new framework for supply chain resilience that leverages existing knowledge and offers a better understanding of the available notion in literature. It incorporates flexibility, adaptability, collaboration, visibility and sustainability as the major pillars for resilient supply chains. This framework provides a new means to evaluate 'supply chain fitness' and also provides critical insights for decision making by minimizing the negative impact of unavoidable risk events. Thus it incorporates event readiness and provides an efficient response.

Reducing Risk in Supply Chains with Forecasting - An Analysis

Richard Lackes¹, Markus Siepermann¹

¹Technische Universitat Dortmund, Germany

In order to achieve just-in-time concepts in supply chains, customers usually have to provide their suppliers with information about required materials. The problem that arises is which forecast data the customer should report to his suppliers when the future demand of his outlet isn't exactly known. This demand is usually subject to a probability distribution. Without any restrictions, the customer will always report those forecast data that correspond to the possible maximum demand of his outlet in order to maintain flexibility. This information will not be useful to the supplier. Therefore, the customer is usually engaged to purchase, within certain limitation periods, that quantity of parts he reported. Otherwise he has to do an adjustment payment. This paper analyses what forecast data the customer should order having previously reported the forecast data.

A Supply Chain Coordination Mechanism with Credit Option Contract Considering Backordered Demand of Customer

Reza Hasani¹, Farid Khoshalhan¹

¹K. N. Toosi University of Technology, Iran

This paper studies the issue of channel coordination for a decentralized supply chain consisting of one manufacturer and one buyer in multi-period setting. Considering the allowance of the backorder at the buyer side distinguishes this work in the literature. The credit option contract as an incentive scheme is pursued to encourage the buyer to participate in the coordination model. Order quantity, credit time and backordered demand in each period as decision variables are determined jointly in order to encourage the chain's member to participate in the coordinating contract. The proposed model shows that the credit option contract in the case of backorder allowance is able to realize the channel coordination in the studied supply chain. A wide range of numerical examples are studied to analyze the sensitivity of the contract efficiency to the inventory system's parameters such as order cost, holding cost and shortage cost.

An Effective Lean Supply Inventory Management Model using VMI Hub

Weidong Lin¹ ¹Temasek Polytechnic, Singapore

This paper describes an effective lean supply inventory management model using VMI hub for electronics industry. For a complex supply chain system, it is desired a lean supply inventory management approach with simplicity and efficiency. The key elements of such a system are identified as suppliers, VMI hubs, and factories. This paper firstly compares the two supply inventory models and explains the benefits of the model with VMI hub. Then the two key processes of the lean supply inventory model with VMI hub are further discussed, i.e. the kit-to-line process between a VMI hub and factories and the JIT suppliers pull process between suppliers and the VMI hub. Finally the pilot run results are shown to suggest significant performance improvements in terms inventory savings and cycle time reductions.

A New Approach in Supply Chain Modeling

M. Pazoki¹, Seyyed Mohammad Taghi Fatemi Ghomi¹, Fariborz Jolai² ¹Amirkabir University of Technology, Iran

²University of Tehran, Iran

This paper introduces a new approach toward modeling supply chain. Instead of minimizing cost or maximizing benefit, we try to set the ratio of revenue to cost to a certain value and minimize cost in this condition, simultaneously. As this ratio is one of the decision criteria in economical engineering context, it may be attractive for industries to decide whether participate in this chain or not. An algorithm is proposed and tested to see whether this approach and this procedure work or not.

Session	Safety, Security & Risk Management
Date	Thu, 8 Dec
Time	15:30 - 17:30
Room	Jupiter I
Chairs	Kai-Way Li, Paolo Trucco

Management Process Quality and Safety at Organizational Level (A Case Study at an International Airport)

Mohammad Shahriari¹, Lennie Edman¹, K. Hamdani¹, Pedro Arezes² ¹Chalmers University of Technology, Sweden

²University of Minho, Portugal

The aim of this study was to explore the relationship between quality of processes and safety at an organizational level, and also to facilitate the implementation of robust system thinking. A model presenting a process based system approach to safety that integrates safety climate is proposed and also a quality evaluation process in line with the value adding process. This evaluation process should be continually improved in the same way as the value adding process in which the employees are adding value together with its support functions. Should attempts to put in driving out fear from organization and ensure more openness and fairness towards its employees. It should also focus on the development of robust system thinking. To achieve this goal, application of a newly developed method is highlighted, by exploring a case study at Landvetter airport control tower.

Emergency Exposure Limits for Toxic Chemicals in Major Hazard Installations of China

Hui Cui

¹Hunan University of Science and Technology, China

In order to determine Emergency Exposure Limits for toxic chemical in GB18218-2009 Identification of Major hazard installations for dangerous chemicals in China, overview of Emergency Exposure Limits was firstly introduced, including Acute Exposure Guideline Level, Emergency Response Planning Guideline, Temporary Emergency Exposure Limit and so on, then attention was paid on the differences and hierarchies of alternative Emergency Exposure Limits, finally Emergency Exposure Limits for toxic chemical in Major hazard installations of China were established based on the following sequences: Acute Exposure Guideline Level, Emergency Response Planning Guideline and Temporary Emergency Exposure Limit. This kind of data migration is feasible, which would be the most economical and effective way in the process of establishing the China's own Emergency Exposure Limit system.

Optimal Risk Response Plan of Project Risk Management Amnon Gonen¹

¹Holon Institute of Technology, Israel

With the increase in project risk management usage, it is becoming increasingly more important to develop methods on how to allocate risk management budgets among the possible mitigation or transfer plans. Today, risk management plans usually rank the risks and recommend how to handle those with high rankings. Neither their response plan nor response feasibility are considered. Out of five possible response categories to an identified risk, only two require a significant budget investment. This study proposes a linear programming approach to budget allocation and demonstrates the budget constraint method, including sensitivity analysis. The results contribute to defining rules about risk management budgeting.

Modeling a Constraint-based Design Risk Management Tool: An Empirical Study for Collaborative Product Design

factors, probability and severity.

Jian Ruan¹, Sheng Feng Qin¹ ¹Brunel University, United Kingdom This paper proposed a constraint-based Design Risk Management (DRM) tool for the improvement of design decision-making under a collaborative product environment. This tool is developed by incorporating collaborative design features, risk management process and theory of constraints (TOC). The research is focused on: 1) exploration of various design constraints from all possible design variables, 2) identification of critical design constraints as design risk factors for design management and decision-making, and 3) evaluation of design risks as a project risk based on the Bayesian theorem. This tool has been prototyped to show that, design managers can use this tool to gain overall design risks during a product design process for their decision-making, and meanwhile it enables other designers to get involved and provide first-hand information on dependency of risk

IT Can Improve Healthcare Management for Patient Safety -Minimizing risk of blood transfusion with

Point-of-Act-System -Masanori Akiyama¹, Atsushi Koshio¹

¹the University of Tokyo, Japan

The purpose of this study is ensuring patient safety of blood transfusion by minimizing risk of transfusion at the point of care through Information Technology. The targets are ensuring five rights of transfusion, rights process and right information by auto identification and traceability of blood products. Auto identification and data capturing system with RFID based on the Point-of-Act-System (POAS). It provides real time right identification, process management to ensure right medication and traceability with serialized number in single item level. The system designed based on process analysis and use case of transfusion was successfully implemented in Red Cross Hospital to prevent transfusion errors and ensure traceability of blood products. By reading RFID at the point of care, we can check database to look for adverse events of blood products. We identified all 377 blood products and acquired tracking data successfully. We can improve patient safety and traceability with RFID.

Occupational Safety & Health (OSH) Performance of SMEs: A Structured Framework

Enrico Cagno¹, Guido Jacopo Luca Micheli¹, Celeste Jacinto², Donato Masi¹ ¹Politecnico di Milano, Italy

²Universidade Nova de Lisboa, Portugal

This paper deals with the use OSH factors for the correct identification and prioritization of OSH interventions especially within the Small and Medium sized Enterprises (SMEs) context, by taking into account the relevant OSH-factors. However, this should not be done on a one-to-one basis, but rather through a meaningful group of connected factors, which together impact on the OSH performance and on the overall performance. On the basis of the above, this paper aims at identifying the OSH-related factors and to work them into a structured framework, using a Focus Group approach. This framework explains each factor on the basis of a set of sub-factors, and clusters the factors into areas of affinity, thus creating three different levels of detail. Finally, the areas of affinity are worked into a hierarchical structure. The hierarchical structure and the three levels of detail are the tools enabling a rational planning of the interventions.

A Clustering Approach to the Operational Resilience Analysis of Key Resource Supply Chains (KRSC): the Case of Fast Moving Consumer Goods

Paolo Trucco¹, David Ward² ¹Politecnico di Milano, Italy

²JRC-ISPRA, Italy

This paper presents a novel clustering approach to modeling interdependencies between critical infrastructures (CIs) and key resource supply chains. The approach is based on Fuzzy Cognitive Map (FCM) theory and the assessment of the impact of service disruption between infrastructures and relative supply chains. The authors discuss a pilot case study concerning the impact of infrastructure disruptions for different temporal frames (i.e. after one day, four days and three weeks) on the Fast Moving Consumer Goods (FMCG) supply chain. The study has been conducted affording a qualitative and cognitive approach based on expert elicitation. The paper concludes with a discussion of findings and current train of thought for future improvements of clustering approach.

Electrostatic Hazards of Polypropylene Powders in the Fluidized Bed Reactor

K.S. Choi¹, K.T. Moon², J.H. Chung², X. Bi³, J. R. Grace³ ¹National Institute of Occupational Safety and Health, Japan ²Seoul National University of Science & Technology, South Korea ³The University of British Columbia, Canada

This paper reports on electrostatic hazards related to a powder fluidized bed reactor. The electric field and the space charge density were monitored over the fluidizing time. We also investigated the minimum ignition energy of sample powders with a Hartman vertical-tube apparatus. A batch-type fluidized bed system containing 1 kg of commercial grade polypropylene resin powder was used in the experiments. The superficial air velocity with zero relative humidity was in the range of 0.2 to 0.32 m/s. Results obtained from the experiments show that the bi-polar charging existed in the reactor during operation. As the superficial air velocity increased, the space charge density in the lower column increased, whereas, the space charge density decreased in the upper column. The electric field generated from charged powders reached a maximum of 250 V/cm, safe level for incendiary electrostatic discharge from charged powders. The powders in the upper column section can be more easily ignited by electrostatic discharges compared to powders in the lower column.

Session	Information Processing and Engineering
Date	Thu, 8 Dec
Time	11:00 - 12:30
Room	Jupiter II
Chairs	Bouchaib Bahli, Shieuhong Lin

Coordinating Time-Constrained Multi-Agent Resource Sharing with Fault Detection

Shieu-Hong Lin¹

¹Biola University, United States

Sharing common resources in a distributed multi-agent environment requires coordination to avoid faulty system states. The statuses of resources such as personnel, equipments, and environmental factors at a point in time determine the system state at that time. When an agent takes an action at any time point within a scheduled time interval, it becomes a state-transition event occurring at that time. For each event, the underlying state transition relation can be compactly encoded as causal rules, which describe how statuses of resources and environmental factors may change in different ways based on preconditions before the event occurs. The central coordinator needs to check in advance whether any of the possible event sequences consistent with a proposed schedule may end in faulty system states. This fault detection task is NP-complete even for a polynomial-size state space in general. In this paper, we investigate the computational complexity of the fault detection task when agents fairly constrain the maximal length of time intervals. We develop a decomposition algorithm to divide the fault detection task over all events into subtasks involving subsets of the events with overlapping time intervals. For each subtask, only a subspace with reduced dimensionality is involved instead of the whole original state space. When the maximal length of time intervals is constrained below a fair threshold, we prove that with probability approaching one as the size of the problem instance grows the algorithm can accomplish the fault detection task in polynomial time even if the original underlying state space is exponential in size.

A Method for Identifying Process Reuse Opportunities to Enhance the Operating Model

Marne De Vries¹, Alta Van Der Merwe², Paula Kotze², Aurona Gerber² ¹University of Pretoria, South Africa

²CSIR Meraka Institute, South Africa

Staying competitive in the 21st century requires enterprise unity and integration, allowing for agility to accommodate swift changes in strategy as markets evolve and new opportunities emerge. The foundation for execution approach acknowledges the volatility of strategy and suggests the use of an operating model (OM), which is a commitment to a way of doing business. The OM creates a company-wide vision for process standardization and data centralization and guides decisions about how a company implements processes and IT infrastructure. Although the OM provides senior management with a powerful decision-making tool in evolving the current IT landscape, the selection of an appropriate OM requires additional guidance. This article elaborates on current OM deficiencies, requirements for enhancement and a new method, mechanisms and practices to enable an enterprise architecture practitioner to identify the required process reuse opportunities for a specific OM.

Dynamic Partitioning for Enterprise Applications

Martin Grund¹, Jens Krueger¹, Juergen Mueller¹, Alexander Zeier¹, Hasso Plattner¹

¹Hasso-Plattner-Institute, Germany

Today's enterprise applications face a severe change in how they process data. They evolved from simple data entry applications to complex systems where the focus is to make the right decision based on latest transactional data instead of pre-processed outdated business intelligence data from secondary systems. This paradigm shift results in more analytical queries executed on the transactional database system. In addition we see a change in how the persistence layer is seen and that more and more effort is spent on developing database engines that are designed to address special needs and requirements, e.g. for Web 2.0 applications. In this paper we discuss that it is crucial for enterprise applications to share application semantics with the database to increase performance. Furthermore we show how this principle can be applied to dynamically partition application data. In contrast to static partitioning we propose to adapt the life-cycle semantics of the application and move data from active to different passive partitions, by leveraging the merge process of our database prototype. The goal is to reduce the amount of data that is touched during query execution to increase the performance of the main workload by the same factor. We present how our HYRISE prototype is implemented and how it can be extended to fully support this use case.

Pitfalls of Information Technology Management Systems Raj Siriram¹

¹University of Witwatersrand, South Africa

In an economy of rapid technological change managers need to be aware of newer technologies and how the adoption of these technologies affects competitive advantages. Information technology management systems are not delivering to business needs. A model is constructed to better understand information technology management systems. This is done using two approaches firstly a) managers information technology preferences are linked to technological benefits, adoption and integration; secondly b) challenges facing managers are identified through a literature survey. Both a) and b) are verified using an expert panel. Important lessons for manager's wanting to invest in information technology management systems are provided.

Fuzzy Hierarchical Clustering based on Fuzzy Dissimilarity YaQiong Lv¹, Carman Ka Man Lee¹

¹Nanyang Technological University, Singapore

This paper develops a new fuzzy hierarchical clustering method based on Agglomerative nesting with the introduction of fuzzy dissimilarity. Since normal hierarchical clustering methods only can be applied for real numbers while a set of possible values, fuzzy numbers are gathered in data collection. It's important to find an effective and efficient way for clustering so as to realize the structure of the complex data for decision making. In this research, the trapezoidal fuzzy numbers are selected in this research, and the proposed new hierarchical clustering method can be competent with the existing clustering method with the given set of fuzzy numbers.

A Comparison of Technology Trajectories between the Global and the United States in Smart Grid

Siou-Zih Lin¹, Ssu-Han Chen¹, Chun-Chieh Wang¹, Dar-Zen Chen¹ ¹National Taiwan University, Taiwan

This study aims to compare the technology trajectories between the United States (U.S.) and the global nations in the smart grid field. Highly cited patents were collected from 2001/1/1 to 2010/12/31 and then were analyzed through bibliographic coupling method, sliding TCT-based citation window and Girvan-Newman clustering for being converted into a global technology trajectory map as well as a U.S. one. Firstly, results show that three of the global technology trajectories are time-lagged than its counterparts of the U.S. one, including electronic trading, dynamic power and workload management, and network monitoring through user profiles. Secondly, we found that two of the U.S. technology trajectories does exist but cannot be found in the global map, containing remote monitoring, automatic trading process and interface circuit system. Lastly, the conditional purchase offer management (CPO Management) and also the dynamic policy management (DPM) of the global trajectories are missing in the U.S. map.

Session	Technology and Knowledge Management (1)
Date	Thu, 8 Dec
Time	13:30 - 15:00
Room	Jupiter II
Chairs	Chien-Liang Kuo, Suli Zheng

Knowledge Management Implementation: Analytic Hierarchy Process Methodology

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The aim of this paper is to understand of Knowledge Management variables (KMVs) and to identify priority weights. It uses analytic hierarchy process (AHP) methodology to prioritize KMVs for supporting the knowledge management (KM) implementation in organizations. These KMVs are selected form the literature reviews and expert discussion. The pair wise comparisons of KMVs (usually, alternatives and attributes) can be established using a scale indicating the strength with which one KMV dominates another with respect to a higher-level KMV. This scaling process can then be translated into priority weights. The AHP can be a useful guide in the decision making process of KM implementation. It has been observed KMV 1 has high priority weights.

Shared Resources, Capabilities and Inclusive Growth of Clustered SMEs: A Multiple Case Study in China

Yilin Fan¹, Guowei Wan¹

¹Zhejiang Shuren University, China

This study examines the mechanism by which shared resources act on capabilities to impact inclusive growth of clustered SMEs. Results indicate that four different kinds of cluster specific shared resources have positive effects on capabilities and capabilities also have positive impacts on inclusive growth of clustered SMEs. The concept model developed in this study thus suggests that capabilities mediate the relationship between shared resources and inclusive growth of clustered SMEs.

Applying K-means Clustering and Technology Map in Asia Pacific-Semiconductors Industry Analysis

Chin Yuan Fan¹, M. F. Lai¹, T. Y. Huang¹, C. M. Huang¹

¹National Applied Research Laboratories, Taiwan

In recent years, the semiconductor market has gradually moved away from advanced countries and relocated to the Asia-Pacific region. Since the 1980s Taiwan has also been developing its own semiconductor industry, and, after twenty years of efforts, has become one of the world's major exporters of semiconductor products. Therefore, in order to position Taiwan in relation to other countries in terms of competitive advantage as defined by technology and industrial development, we need to better understand developmental trends of semiconductor technology of major competing countries in the Asia-Pacific region. By doing this we can further provide our government with additional strategic development proposals. In this study, we used a combination of patents, data mining methods (multidimensional scaling (MDS) analysis, and Kmeans clustering) to explore competing technological and strategic group relationships within the semiconductor industry in the Asia-Pacific region. We assessed the relative technological advantages of various organizations and proposed additional technology development strategy recommendations to Taiwan's semiconductor industry.

Roadmapping an Emerging Technology in Clean Energy Industry: A Case Study of Dimethyl Ether Development in China

Yuan Zhou¹, Guannan Xu¹, Jun Su¹, Tim Minshall², Qiang Zhi¹ ¹Tsinghua Universitu. China

²University of Cambridge, United Kingdom

Technology roadmapping has been used to strategize the development of energy technologies. However, there is limited roadmapping application that analyzes the emergence of a new energy technology and elaborates how this new technology forms a new industry and disrupts the old ones. This paper, therefore, focuses on the development of a roadmapping framework for strategizing the emergence and growth of a clean energy technology towards an industry, and proposes a systematic approach to integrate the lifecycle analysis (LCA) tool that is specific for assessing energy technologies. The proposed framework has been tentatively applied in a national-level strategic research on clean coal development, conducted by Chinese Academy of Engineering. This proposed framework can also be generalized to other clean energy industries, and we anticipate our paper will bring inspirations on roadmapping and strategizing the "right" technologies for the growth of Chinese energy industries.

Structure of International Research Collaboration in Wind and Solar Energy

Ichiro Sakata¹, Hajime Sasaki¹, Toshihiro Inoue¹ ¹The University of Tokyo, Japan

Climate change is a common global issue. Advanced technologies to tackle the problem are spread throughout the world. Among varies kind of energy sources, wind power and solar cell are the most promising technologies for green growth. This paper will first aim to identify the structure of international research collaboration in wind power and solar cell. Secondly, this paper will compare both structures and discuss factors that would create and support international relationships. We use bibliometric approach. The research collaboration networks in wind power and solar cell include 4,189 and 6,660 institutions, respectively. We find that physical distance, international S&D policy, historical and institutional factors, and maturity of technologies have a large impact on the research collaboration.

Session	Technology and Knowledge Management (2)
Date	Thu, 8 Dec
Time	15:30 - 17:30
Room	Jupiter II
Chairs	Harm-Ian Steenhuis Mohammed-Aminu Sanda

A Methodology for Tracking the Impact of Changes in (re)Designing of the Industrial Complex Product Nattawut Janthong¹

¹King Mongkut's University of Technology North Bangkok, Thailand

Engineering design in today's market faces a wonderful challenge. From the intense competitive business environment, the increasing demand of variety by customers and the exceptional boost of technology, new products have to be designed and manufactured with high performances in low-time, high-quality and high value output that can provide competitive advantage. Thus, modularity, commonality and variety are important and complementary concerns in differentiated product features to meet particular customer requirements. Moreover, the new design must re-configure, re-parameterize and re-align etc. the existing architecture with the component modules to be changed. Therefore, the impacts are on modification of components but also on the global behavior of the whole product; it can also bring constraints to another function. Hence, all the impacts of those elementary works have to be identified. This paper introduces method and tool to aid designers in understanding the potential effects of change based on studies of industrial complex product.

Dynamic Interactions between Knowledge Creation and Resource Mobilization in R&D Management: A Case of the Inkjet Innovation in Japan Ken Hashimoto¹, Shuzo Fujimura¹

¹Tokyo Institute of Technology, Japan

Based on dynamic interactions between knowledge creation (KC) and resource mobilization (RM), we propose a new research method for a firm's R&D management using two indicators: transition of new product technologies for KC, and dynamic change in the number of inventors for RM. We apply the proposed method to the R&D competition between Canon's thermal inkjet (TIJ) and Seiko Epson's piezoelectric inkjet (PIJ) over three decades. The results suggest that a firm's KC direction is controlled by its technology selection, and its RM is influenced by the competitor's KC rather than its own KC. RM rate seems to reveal a firm's strategic position: "competition between technologies" or "habitat segregation of technologies."

Evaluation of the Sci-tech Service Industry Based on Factor Analysis - A Demonstration Study of 30 Provinces in China Hongtao Yang¹, Huiling Huang¹

¹Harbin Engineering University, China

This paper attempts to establish an evaluation index system for the sci-tech service industry, and utilizes Factor Analysis to analyze the competitiveness of sci-tech service industry of 30 provinces in China. By using Factor Analysis, this paper extracts three common factors and tries to explain and define them, then ranks the 30 provinces in China according to the score each common factor and comprehensive evaluation. According to the result, we can get the conclusions that the sci-tech service industry of Heilongjiang Province needs to develop and improve. Finally, some countermeasures are put forward to encourage and develop the sci-tech service industry of Heilongjiang Province.

Using Methodologies to Embed Knowledge into the Information Systems Development Process: An Investigation into the IT Sector in China Younes Benslimane¹, Zijiang Yang¹

¹York University, Canada

This paper investigates the use of methodologies in the Information Technology (IT) sector of China. Based on a knowledge management perspective, this paper examines how knowledge derived from a methodology can be used to support the Information System (IS) development process and to improve the chances of success of IS development projects. Three specific domains of knowledge are considered in this analysis: "production support" knowledge, "control support" knowledge and "cognition support" knowledge. Findings from a survey of 82 senior IT professionals showed that the adoption of methodologies helps to embed valuable knowledge into the IS development process. The routine utilization of the stock of knowledge hence embedded allows to improve the IS development process and the performance of IS development projects. The implications for research and practice are discussed.

The Impact of Openness on Innovation Performance of China's Firms: from the Perspective of Knowledge Attributes Xiaoting Zhao¹, Liang Liang¹

¹Zhejiang University, China

Chesbrough's open innovation paradigm offers a new way to develop innovation strategy. Open innovation could improve innovation performance, but too much openness would bring negative impacts to innovation performance due to the leakage of key technology, the searching cost and the transaction cost. This research tries to explore the relationship of openness and innovation performance of China's firms and find the moderating roles of the knowledge attributes of R&D projects. Based on the literature review and theoretic analysis, the paper discusses the influence of openness on innovation performance from the perspective of knowledge attributes, develops a conceptual model and generates six hypotheses worth further study. This study presents more profound insights on how knowledge attributes influence the effect of open innovation, which may add both academic and practical value to the field of open innovation.

Measurement and Improvement of Individual e-Business Capability

Chui Young Yoon¹, Byung Hwan Kim² ¹Chungju National University, South Korea ²Korea Politec II College, South Korea

Measuring an individual e-Business capability is important to manage and improve their work ability in an e-Business environment. This study presents a tool to measure an individual e-Business capability with the measurement items, process, and method based on the previous literature. The developed tool construct were verified by factor and reliability analysis. This tool has four measurement factors and sixteen items. The utilization of the developed tool was confirmed by applying it to a case study.

Relations between Corporate Philanthropy and Antecedent Variables: Based on the Empirical Data

Xueying Tian¹ ¹Suzhou University of Science and Technology, China

Corporate philanthropy is growing rapidly in the whole world. Based on theory analysis, we propose four research hypotheses which show that these factors have influence on corporate philanthropy. And then a research was made of the data collected from 428 firms involved in philanthropy from Shanghai securities exchange in 2008. The test based on regression analysis show that the firm size, the assets-liabilities ratio and the educational level of manager have influence on donation amount, and the effects of three antecedent variables on corporate philanthropy are different. Finally, an outlook is proposed in the future.

Key Performance Indicators for Sustainable Manufacturing **Evaluation in Automotive Companies**

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Andalas University, Indonesia

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The automotive industry is regarded as one of the most important and strategic industry in manufacturing sector. It is the largest manufacturing enterprise in the world and one of the most resource intensive industries of all major industrial system. However, its products and processes are a significant source of environmental impact. Thus, there is a need to evaluate sustainable manufacturing performance in this industry. This paper proposes a set of initial key performance indicators (KPIs) for sustainable manufacturing evaluation believed to be appropriate to automotive companies, consisting of three factors divided into nine dimensions and a total of 41 sub-dimensions. A survey will be conducted to confirm the adaptability of the initial KPIs with the industry practices. Future research will focus on developing an evaluation tool to assess sustainable manufacturing performance in automotive companies.

Session	Facilities Planning and Management
Date	Thu, 8 Dec
Time	11:00 - 12:30
Room	Jupiter III
Chairs	Ching-Tsung Hung, Mahdi Bashiri

A Fuzzy Set Covering-Clustering Algorithm for Facility Location Problem

Rashed Sahraeian¹, Mohammad Sadeq Kazemi²

¹Shahed University, Iran

²Shahid Bahonar University of Kerman, Iran

Mathematical models and solution algorithms which address the problem of locating facilities and allocating customers varies widely in terms of basic assumptions, mathematical complexity and computational performance. In this paper, we are concerned with a problem of locating the number of facilities among a finite number of sites such that all existing sites (customers) are covered by at least one facility. The problem was modeled and solved in three stages. In the first stage, an improved fuzzy set covering solution was proposed to determine the minimum number of facilities. In the second stage, the well known k-means clustering algorithm was applied for demand classification into groups. In the third stage, the assignment model was used to locate facilities in each cluster. Using extensive simulation studies, we also show that the proposed approach performs considerably well in all considered conditions in comparison to classic covering methods.

The Scenario Based Regret and Min-Max Regret Approach for Location-allocation Model of Distribution Center, with Uncertain Parameters

Mahdi Bashiri¹, Amir Moslemi¹

¹Shahed University, Iran

The paper discusses about the location-allocation model for distribution centers under an uncertain environment while demands and transshipment costs change as model parameters. This may leads to large cost deviation in total cost of the model between designed optimal model and real optimal one. Scenario based robust optimization approaches including regret and Min-max regret are proposed based on the stochastic optimization. A Numerical example illustrates the proposed model and the results have been reported. Finally the comparison of results for mentioned approaches has been done for better explanation.

Warehouse Storage Assignment: the Case Study of Camera and Lense Manufacturer

Chompoonoot Kasemset¹, C. Rinkham¹

¹Chiang Mai University, Thailand

This study presents the application of storage assignment in warehouse management to the case study of camera and lense manufacturer located in Thailand. The objective is to improve the movement of products and parts used in the assembly line by proposing two new policies for storage assignment. The policies are based and evaluated; by product model and part customer. These policies are practical because they can be simply implemented and understood by workers. The results of the two policies as compared with the existing system give the total transportation distance of 5375.6 meters per day, 5262.7 meters per day and 6282.2 meters per day, respectively which indicate a reduction of 14.43% and 16.23% from the existing situation.

A Simulated Annealing for Solving a Group Layout Design Model of a Dynamic Cellular Manufacturing System

Reza Kia¹, Reza Tavakkoli-Moghaddam², Nikbakhsh Javadian³, Mohammad Kazemi³, Javad Khorrami³

¹Islamic Azad University, Iran

²University of Tehran, Iran

³Mazandaran University of Science and Technology, Iran

This paper presents a novel mixed-integer non-linear programming model for the layout design of a dynamic cellular manufacturing system (DCMS). A novel aspect of this model is concurrently making the cell formation (CF) and group layout (GL) decisions in a dynamic environment. The proposed model incorporates several design features including alternate process routings, operation sequence, processing time, production volume of parts, purchasing machine, duplicate machines, machine capacity, lot splitting, intra-cell layout, inter-cell layout, multi-rows layout of equal area facilities, and flexible reconfiguration. An efficient simulated annealing (SA) algorithm is extended to solve the proposed model because of its NP-hardness. It is then tested using several problems with different sizes and settings to verify the computational efficiency of the developed algorithm in comparison with the Lingo software. The obtained results show that the proposed SA is able to find the near-optimal solutions in a reasonable computational time.

A Multi-Period Facility Location-Relocation Problem in the Presence of a Probabilistic Line Barrier

Mehdi Amiri-Aref¹, Nikbakhsh Javadian¹, Reza Tavakkoli-Moghaddam²,

M.Bahador Aryanezhad³ ¹Mazandaran University of Science & Technology, Iran

²University of Tehran, Iran

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This paper presents a mixed-integer nonlinear programming model (MINLP) for a multi-period facility location-relocation problem in the presence of a line-shaped barrier, which the starting point of the barrier follows the uniform distribution function. Rectilinear metric for the distance between points is supposed. The objective function of the proposed model minimizes the cost of traveled expected barrier distance and the cost of relocation, if occur, during the finite planning horizon. In addition, to show the capability of the proposed model, a numerical example is investigated and the associated results are compared with the results of problem without barrier.

Session	Engineering Economy and Cost Analysis
Date	Thu, 8 Dec
Time	13:30 - 15:00
Room	Jupiter III
Chairs	Chia-Liang Hung, Corrado lo Storto

Production System with Respect for Variable Quantities for an Economical Electric Vehicle Production

G. Schuh¹, Achim Kampker¹, Peter Burggraf¹, Carsten Nee¹

¹University of Aachen, Germany

The increasing amount of traffic in modern mega cities as well as the scarcity of oil makes the mobility of the future a social core problem. The awareness of emissions and environmental friendliness attract major interest in electric mobility. Electric vehicles are in direct competition with conventional powered cars, but high prices lead to a very reserve acceptance and market diffusion. Companies need to build up competencies to develop and produce electric vehicles which are attractive to customers; potentials lie in a complete purpose-oriented redesign according to the specification of electric mobility. An integrated product and process development helps to tap the full potential in terms of cost and value-oriented production. New production processes bundled in a production system need to be identified to reduce production costs, enabling e-mobility to compete with conventional powered cars.

Cost-effective Planning of Energy-measurement-systems

Egon Mueller¹, Markus Buschmann², Kai-Uwe Wonneberger²

¹Chemnitz University of Technology, Germany ²Volkswagen AG, Germany

The lack of information concerning energy flows can be seen as a significant barrier to increase energy efficiency in an industry. The extension of energy measurement systems often fails due to the difficult appraisal of expected reflux. The shown model presents a way to overcome this barrier by forecasting potentials and also including soft facts into the appraisal. Learning effects objectify the presented model through time and make it more stable. In result, an expected net profitability of installing a measurement device into a given technical system.

A Review on Models and Practical Methods for Economic Evaluation of Occupational Safety and Health (OSH)

Enrico Cagno¹, Guido Jacopo Luca Micheli¹, Donato Masi¹, Celeste Jacinto² ¹Politecnico di Milano, Italy

²Universidade Nova de Lisboa, Portugal

The aim of this paper is to present a literature review on models and methods (tools) currently available for economic evaluations of OSH. The work methodology involved a search through international databases and science search-engines, as well as examining citations from other authors. This scrutiny allowed establishing the state of the art in this field. As a result, relevant features of current approaches are characterized here and some methodological limitations in this domain are briefly discussed; emphasis is put on the particular needs of Small and Medium-sized Enterprises (SMEs). The main contribution of this review is that it constitutes an up-to-date platform from where to launch new developments and improvements in this research area.

Survey on Energy Efficiency Measurements in Heterogenous Facility Logistics Systems

Christian Prasse¹, Andreas Kamagaew¹, Sebastian Gruber², Kathrin Kalischewski¹, Stefan Soter², Michael ten Hompel³ ¹Fraunhofer Institute for Material Flow and Logistics, Germany

²University of Wuppertal, Germany

³TU Dortmund University, Germany

Basically there are two ways to improve the energy efficiency of heterogeneous material flow systems - modification of technical components and control with intelligent strategies. In order to reduce the consumed energy the design, configuration and control strategy of different conveyor systems have to be analyzed by mechanical and electrical measurements. To quantify the need of energy under conditions as close as possible to reality a testing facility with different conveyor elements and electrical drives with power monitoring capabilities was installed in order to give a database for further research activities. On the one hand the acquired data can be used to optimize the efficiency of the total drive train. On the other hand they conduce to develop new intelligent control strategies for an energy efficient operation of heterogeneous facility logistics system. Eventually, the design of a monitoring system in a testing facility is the topic of this contribution.

Benchmarking in the Public Service Industry: The Italian Water Service Management Sector Corrado lo Storto¹

¹University of Naples Federico II, Italy

The paper undertakes a benchmarking study of the water service management sector in Italy using Data Envelopment Analysis. The optimal territorial area (ATO) is chosen as unit of analysis, while sample investigated includes 38 ATOs. Both technical and scale efficiency are evaluated. Results of DEA implementation show that the average pure technical and scales efficiency are situated at 92.62% and 93.91%, respectively. Findings also show that efficiency is neither related to service average tariff nor to investment planning effectiveness. Returns to scale are investigated too.

Agent-Based Simulation of Economic Sustainability in Waste-to-Material Recovery

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¹Singapore Institute of Manufacturing Technology, Singapore

²Nanyang Technological University, Singapore This paper presents an agent-based approach to the economic sustainability evaluation of adopting competitive recycling technologies in waste-to-material recovery. The emphasis is put on the development of economic sustainability metrics for this evaluation and on the software implementation of an agent system to evaluate sustainability by using these metrics as agent simulation models. A set of model-driven sustainability metrics were defined to quantify the economic impact of technical innovations in waste management. A software agent was designed and implemented for simulating process scenarios to consistently evaluate the economic sustainability of different waste-to-material recovery systems. Using the sustainability metrics and the agent developed, a case study was conducted. Two recovery processes were evaluated and compared for their economic sustainability, measured in unit cost, share of cost of materials, process efficiency, in-process recycling rate and economic efficiency.

Session	Service Innovation and Management
Date	Thu, 8 Dec
Time	15:30 - 17:30
Room	Jupiter III
Chairs	Suhaiza Zailani, Stephen Zhang

The Activities and Typologies in Service Innovation Design and Deployment: A Socio-Technical Perspective on **University Based Living Lab**

Hung Chih Lai¹, Kae Kuen Hu², Li Wei Chen²

¹Shih Chien University, Taiwan

²National Taiwan University, Taiwan

The Living Lab approach is widely used to be a practical framework to achieve the goal of value co-creation. However, the complicated problems between stakeholders are still remaining. This study tries to define the knowledge characteristics of the projects in the living lab, and explore the activities and driving forces in service innovation process in order to construct an analytic model of the mechanism.

This explorative study uses "Grounded theory" as its primary methodology. Base on the 8 cases, processes in service innovation modeling can be sorted into four phases roughly: collaboration, service design, market guidance, and service deployment. We discovered that collaborative actions of participants would free up hierarchical limitations to concentrate on higher level management tasks with tacit understanding interactions for the common goal in the service innovation construction phase. An activities-based model is then applied to demonstrate the differences of the participants, while some theoretical and practical implications are discussed.

Service Quality, Brand Image and Price Fairness Impact on the Customer Satisfaction and Loyalty Chi-Chuan Wu¹, Shu-Hsien Liao², Yin-Ju Chen², Wei-Lun Hsu¹

¹University of Tatung, Taiwan ²Tamkang University, Taiwan

As the times progress and the enhancement of the public educational level, life insurance has been paid much attention day by day. Especially, medical insurance plays an important role in all sorts of life insurance. Medical insurance is the invisible merchandise. While customers buy the invisible products, they usually place an importance on invisible factors. The study problem into the direct impact on service quality, brand image and price fairness; This research anticipates after applying structural equation modeling (SEM), while customers buying the medical insurance; service quality and brand image has direct and positive impact on the customer satisfaction, service quality and brand image has no direct and positive impact on the customer loyalty. But service quality and brand image has direct and positive impact on the customer loyalty through customer satisfaction. After analysis, customer satisfaction has a direct and positive effect on customer loyalty. Finally, after measure of price fairness, whether it is a direct impact on customer satisfaction, customer loyalty, or indirectly affect customer loyalty through customer satisfaction, all have no significant impact.

The Feasibility of System Dynamic Modeling in Value Assessment of Industrial Services

Ville Ojanen¹, Samuli Kortelainen¹, Sakari Hyppanen² ¹Lappeenranta University of Technology, Finland ²Capgemini Finland, Finland

This paper aims at revealing the possibilities of system dynamic approach in value assessment of industrial services. The novelty of the paper lies in the fact that current theoretical approaches and current practices of comprehensive value assessment in companies do not fully meet the needs of industrial firms. These needs relate to bringing forth the customer value elements and foundations for service pricing which firms need to communicate to their customers. The presented approach is based on integrating the theoretical frameworks found in the literature and practical needs derived from interviews of industrial maintenance service firms. An illustrative example of simulating different investment options and maintenance strategies is finally presented to clarify the multiple benefits and aspects of system dynamic modeling of industrial service system value.

Intermediating R&D and Marketing Value Creation by Open Innovation

Shu Wang¹, Jin Chen¹, Fang Xie¹

¹Zhejiang University, China

Based on the open innovation theory the paper explores several notable enterprises' behavior from high-tech products to service providers, and by comparing and contrasting the use of the service-based organizations and external R&D-related activities in companies at home and abroad, it pointed out how an eco-community or

commercial system can make it possible for the firms looking for service and business to accomplish the external R&D-related activities and marketing objectives. And by discussing the panel data of R&D expenditure of companies in China, the paper analyses what kind of strategy and effort should be taken for attract the complement resources from OI eco-community, especially by the firms' appetite survey for OI process, it can be seen that inexorable R&D and marketing service make social technology more important over time in some developing economies which make the subject area of service and relationships a particularly important one for marketing value creation.

The Connection Between Customer Value Creation and Innovation Strategy: A Proposed Framework and Its **Implication in Fashion Products**

Chien-Liang Kuo¹, Chien Chiang Lin², Yen-Kwan Wu³ ¹Chinese Culture University, Taiwan

²Shih Hsin University, Taiwan

³Industrial Technology Research Institute, Taiwan

The widespread concept of total customer value helps raise the issue of how to generate value through user-centric view. This article puts its emphasis on the sources of customer value creation and corresponding innovations strategies, which were validated through a pilot study in Taiwan. This study also compares commonalities and unique characteristics on three fashion products from the customer value creation perspective through the survey. The following implications are concluded. First, nine factors and 51 elements were identified to be useful for increasing customer value for Asian or Chinese people. Moreover, some factors (e.g., emotional and delicacy factors) are found different from those discussed in previous studies. Finally, practical guidelines for value-based innovation are also discussed in this paper.

Service Innovation for the User Interface of an ATM Catering to the Needs of the Student Community Girish Krishnan¹, Sanjay Kumar¹, Jithin C.R.¹, Vinay V. Panicker¹, R

Sridharan¹

¹National Institute of Technology Calicut, India

The paper develops and analyzes the simulation model of an automated teller machine (ATM). This case study is carried out on an ATM installed in an Institute of National importance in the Southern part of India. Two simulation models have been developed to analyze the effectiveness in a modified ATM. This work proposes to provide information about the availability of a particular denomination of currency before the customers enter the system.

Adoption of New Service Development Tools in the Financial Service Industry

Dayu Jin¹, Kah-Hin Chai¹, Kay-Chuan Tan¹

¹National University of Singapore, Singapore

This paper looks into antecedents of new service development tool adoption by using Theory of Planned Behavior. Empirical study was conducted among Singapore financial service firms. The results show that usefulness, ease of use, compatibility and resource commitment significantly affect tool adoption behavior.

Identification of Best Practices to Achieve Innovation, **Corporate Entrepreneurship and Spinoff in Chilean** Companies

Alfonso Bastias¹, Patricio Cortes¹

¹Universidad del Desarrollo, Chile

The Corporate Entrepreneurship is the entrepreneurial behavior that has an objective to create new businesses inside medium and big companies, focusing on innovation of products and processes and the development of new markets. Spin Off is a broad concept that refers to a separation of a unit within the parent company. The motives to achieve this are various, but generally are referred to the search of wining flexibility and simplicity in the operation of a particular business. Corporate's Spin Offs is originated by one or more individuals (Spin-Off entrepreneurs)C that are looking for the development and capture of a high potential idea, that is based on the experienced acquired within the parent company[1, 2].

In a collaborative effort between CORFO1- Corporación de Fomento a la Producción, CPC2 - Confederación de la Producción y del Comercio, y el IDB3 - entrusted Universidad del Desarrollo with a study to evaluate and identify the best practices that incentive the Corporative Spin Off in Chile. The program included the participation of a total of 46 companies, through five independents agencies, identifying the more relevant characteristics that the companies has to have in order to increase the probabilities of success in the implementation of corporative Spin Offs.

Session	Poster Session 2
Date	Thu, 8 Dec
Room	Venus III

Application of Fuzzy Mathematical Programming to Optimize an Integrated Production-distribution System

Fardin Ahmadizar¹, Mehdi Zeynivand¹ ¹University of Kurdistan, Iran

Providing an efficient unified plan that integrates production and distribution plans in an uncertain environment is necessary to ensure the overall effectiveness of supply chain management. This paper presents a fuzzy bi-objective linear programming model for integrating multi-product and multi-period production-distribution planning into a unified framework considering fuzzy production and demand. In this model, products deliver to retailers through cross docking or direct shipment strategies. The aim is to determine the optimal configuration of the production-distribution network in order to simultaneously minimize the total costs and design a JIT distribution system in a three-echelon supply chain. Triangular fuzzy numbers are used to represent fuzzy parameters, and a two-phase approach based on a weighted average method and weighted additive model is applied to solve the proposed model. A numerical example is then used to validate the applicability of the model.

Supplier Development: a Decision Making Problem

Zahra Sharafi¹, Jamshid Parvizian²

¹MAPNA Group, Iran

²Isfahan University of Technology, Iran

Supplier development is considered here as a decision making problem. The decision should be made by the buying firm to dedicate efficiently its limited resources to develop its suppliers, based on their strategic importance. The proposed model has three stages. Suppliers are clustered according to their eligibility for resource allocation, using Self Organizing Maps (SOMs). Then the gap between their current and desired statuses during cooperation is measured. Strategies are designed to improve suppliers to reach the desired status. Different relationship and development strategies should be employed for each cluster according to their characteristics.An industrial case is presented to show how the model can be used in real life.

Application of Fuzzy-AHP Extent Analysis for Supplier Selection in an Apparel Manufacturing Organization

Mohammad Mahmudur Rahman¹, Kazi Badrul Ahsan¹

¹Khulna University of Engineering and Technology, Bangladesh

A supplier selection is inherently a multi-criterion decision making problem. It must be systematically considered as it is a decision of strategic importance of companies. Lots of models have been developed to find an optimum solution of this complex and unstructured decision making problem. Fuzzy Analytic Hierarchy Process (Fuzzy AHP), which is a synthetic extension of classical AHP, is one of the best method for deciding among the complex structure at different levels. In this paper an extent analysis of fuzzy analytic hierarchy process (AHP) has been applied to evaluate and select the best supplier firm providing most satisfaction. The evaluation criteria are developed particularly for an apparel manufacturing organization and used successfully in the proposed model. A detailed step-by-step implementation method is presented in this paper and finally the best supplier was selected to prove the validity of the method.

A Model for Evaluating Lean, Agile, Resilient and Green Practices Interoperability in Supply Chains

Pedro Espadinha-Cruz¹, Antonio Grilo¹, Rogerio Puga-Leal¹, Virgilio Cruz Machado¹

¹Universidade Nova de Lisboa, Portugal

Due to market pressures and increased competition, companies were led to adopt collaborative working practices by creating communication networks and integrated material and product flows. Supply Chain Management is one key to success in this sector, being one recent and powerful operations strategy tool that led to success in many enterprises all over the world. However, it is not affordable to conduct SCM's newest methodologies like Lean, Agile, Resilient and Green being subject to problems of interoperability. This paper presents a model to evaluate the overall business interoperability and establish what measures can reduce interoperability problems in the SC.

Arena Simulation Model for Multi Echelon Inventory System in Supply Chain Management Kunal Patil¹, Kai Jin¹, Hua Li¹

¹Texas A&M University-Kingsville, United States

Supply chain inventory management (SCIM) is an integrated approach to the planning and control of inventory throughout the whole network of cooperating organizations from source of supply to the end user. Research shows that Multi Echelon Inventory System can help companies save costs. In this paper, simulation model is being developed for multi echelon inventory system in supply chain using Arena 7.0. Model consists of three active members in it: One distribution center, three retailers and customer. Our model focuses on improving sales and reducing lost sales by introducing the interrelationship among retailers. The simulation results show that interrelationship with sharing inventory among retailers will help retailers increase their sales.

Stability of Production Lines with Multiple Delays

Narthan Čemal Saadet¹, Ali Fuat Ergenc¹

¹Istanbul Technical University, Turkey In this study, the effects of time delays in the stability of a production line system are investigated. The time delay, which may be caused by whether machine failure, human error or product change, is very important parameter in the production line. Production period can be also considered as pure time delay in the modeling of production systems. Continuous flow models are used represent the dynamics of production lines incorporated time delays in the model. The reference model for the study consists of three independent lines of which two of them are parallel to each other and the last one is tandem to those, with each having their own limited capacity buffers. Our goal is to determine the system's stability regions that are drawn in the space of time delays based on production rates in order to give decision makers a guideline how to balance production lines facing time delays.

Fuzzy Guidance Strategies for Fair Multi-Agent Negotiation of Wholesale Price Contracts

Omar Kallel¹, Ines Ben Jaafar¹, Lionel Dupont², Khaled Ghedira¹ ¹Universite de Tunis, Tunisia

²Universite de Toulouse, France

In this paper, we investigate the negotiation aspect of wholesale price contracts in a supply chain with a retailer buying from several subcontractors. The objective is to help actors in an asymmetric informational context to reach agreements and establish fair contracts. Thus, we present two multi-agent models with the same architecture; a retailer agent negotiating with several subcontractor agents and a fair agent trying to provide some fairness guidance in the negotiation. In the first model (AGS), the fair agent intervenes when an agent makes a relatively low or high offer; he asks this agent to behave differently. In the second model (DGS), the fair agent intervenes when a significant difference appears between the margin rates of the negotiators; he directs them by giving the new rate to apply in the next step. Experiments show more fair results with DGS than AGS.

A Simulation Comparison Analysis of Effective Pallet Management Scenarios

Maria Ğrazia Gnoni¹, Gianni Lettera¹, Alessandra Rollo¹ ¹University of Salento, Italy

Pallet management usually involves direct and reverse logistics flows; it represents a critical activity for several logistics providers all over the world. Pallets are needed in order to ship products through the whole supply chain. In the European area, a standardized quality-assured system – defined as the "EPAL-System" – works as direct or postponed interchange could be applied. Service level could be improved by both increasing pallet availability in the direct logistics and reducing total cost of the reverse logistics. The purpose of this paper is to provide an effective comparison of different pallet management scenarios based on EPAL-System. The two organizational interchange procedures allowed by the EPAL-System have been tested. A simulation model has allowed to compare four scenarios in terms of supplier's service time, internal operations, and overall operating costs. Results confirm that a better coordination of actors in the reverse chain enables to increase performances of the whole system.

Does Topology Matter? Land Price and Road Network

Satoru Yamamoto¹, Yuya Kajikawa¹ ¹The University of Tokyo, Japan

Forecasting market dynamics has been the prior concern for financial studies. But current models with historical data, demographic feature, and econometric indicators does not show satisfactory performance. The scope of this paper is to develop a model to forecast land prices. We applied network analysis to express the structure of complex road networks and extracted effective features influencing land price. We demonstrated that the price model including the features extracted from the road networks showed better performance in forecasting the price than that with demographic features.

Market Information, Scope Economies, and Make-or-Buy **Decision under Information Asymmetry**

Suxiu Xu1, Qiang Lu1, Xiaoming Hu1

¹Harbin Institute of Technology, China

This paper studies a make-or-buy (M-B) model in which a firm (say Firm 1) may outsource a product to the unique vendor, the monopolist in the outsourcing market, or produce in-house. A traditional solution is provided based on both parties' perfect information (PI). In the case of asymmetric information (AI), the vendor abandons the virtual information reported by Firm 1 and announces its "supply menu" to guarantee a certain yield for itself. We demonstrate, when outsourcing occurs under AI, both parties' expected profits increase with (Firm 1's) forecast accuracy if and only if "good" news is received. Outsourcing strictly dominates in-house production if the yield of the vendor's production input is sufficiently low or its economies of scope are remarkably attractive. Furthermore, it is optimal for Firm 1 to hold information at first and decide whether or not to pool information only after the vendor's "supply menu" is announced. However, the vendor's profit is constrained by the trade-off between the coordination effort that invested on pursuing Firm 1 to pool information and the advantages resulting from its status of outsourcing market, production cost, as well as scope economies.

Developing a New Consumption Experience Scale for **Taiwanese Fine Foods Culture**

Ching-Yu Lien1, Shu-Hwa Hsiao1

¹Minghsin University of Science and Technology, Taiwan

The purpose of this study explores the experiences and feelings of consumers regarding Taiwanese fine foods culture before developing the conceptual structure of a consumption experience scale for Taiwanese fine foods culture. This paper uses Confirmatory Factors Analysis (CFA) to examine 547 samples and Structural Equation Modeling (SEM) to verify the reliability and validity of the proposed consumption experience scale for Taiwanese fine foods culture. The results show that the overall fit index, measurement, reliability, and the validity that the scale developed using this research are all within the reasonable scope, which indicates that the proposed consumption experience scale for Taiwanese fine foods culture is sound in reliability, validity, and fit. The results of this study provide researchers with further related examinations and data.

A Model for Carbon Management of Supplier Selection in Green Supply Chain Management

Chia-Wei Hsu¹, S. H. Chen², Cherng-Ying Chiou³

¹Tungnan University, Taiwan

²National Taipei University of Technology, Taiwan

3 Overseas Chinese University, Taiwan

This study aims to utilize the Decision-making Trial and Evaluation Laboratory (DEMATEL) and Analytic Network Process (ANP) approach to recognize the causality and determine relative weights of evaluation criteria of carbon management in green supply chain for improving the overall performance of suppliers in terms of carbon management. Thirteen criteria of carbon management with three dimensions were identified from literature review and interview with three experts at an electronics manufacturer. Results indicated that the four most important criteria of supplier selection in terms of carbon management were carbon governance (0.180), management systems of carbon information (0.163), training related to carbon management (0.142), and carbon policy (0.125). The proposed framework of supplier selection that can offer an insight for managers to understand cause-effort relationship and to select appropriate suppliers that is capable of having competence in carbon management and to improve suppliers' performance.

The ADT Evaluation Method Based on MCMC

Lizhi Wang¹, Xiaoyang Li¹, Tongmin Jiang¹, Xiaotian Zhuang² ¹Beihang University, China

²Arizona State University, United States

This paper proposes an accelerated degradation testing (ADT) evaluation method based on Markov Chain Monte Carlo (MCMC) method. Firstly the degradation model, reliability model and accelerated model of ADT are introduced; secondly, with the information above, the ADT evaluation method based on MCMC is proposed; Thirdly, the evaluation results of this method would be studied and compared with the evaluation results of the maximum likelihood estimation method by two simulation examples. Finally, the method proposed is taken to evaluate the lifetime and reliability of super luminescent diode (SLD) as an engineering application.

The Impacts of Common Cause Failures for Two-Unit Parallel Systems from RAMS+C Point of View

Chun-Yuan Cheng¹, Min Wang¹, Bee Leng Lee² ¹Chaoyang University of Technology, Taiwan ²San Jose State University, United States

Common cause failures usually occurred in redundant systems in which the units or components are either identical or sharing the same power supply. Earlier research aim to improve reliability, availability and maintenance (RAM) of safety-related equipments by establishing optimal testing schedules for those systems. However, frequency maintenance tasks may not only induce unexpected failure due to inappropriate maintenance, but also increase the maintenance cost. Cost-effective preventive maintenance model for the equipments were provided to maintenance equipment availability with minimal cost. In this study, the impacts of common cause failures (CCF) on the testing schedule and average maintenance cost are provided.

Redundancy Allocation for Series-Parallel Warm-Standby Systems

O. Tannous¹, L. Xing¹, P. Rui², Min Xie², S.H. Ng²

¹University of Massachusetts, United States ²National University of Singapore, Singapore

Increasing the reliability of a system is generally achieved by using redundant components, which results in raising the system cost. A great challenge in system design is to improve the system reliability while still meeting the resources limitations, typically the budget constraints. This paper considers the redundancy allocation problem (RAP) for series-parallel systems with warm standby sparing (WSP). WSP is a type of dynamic redundancy that compromises the energy consumption of a hot standby sparing system and the recovery time of a cold standby sparing system. The existing RAP solutions mainly focus on systems with cold and hot standby redundancies. This paper presents two optimization solution methodologies, respectively based on genetic algorithm and integer programming to achieve optimal design of a series-parallel with warm standby redundancy. Both methodologies are illustrated using examples.

Simulation-Assisted Estimation of Failure Models with **Stochastic Hazard Rates**

Ke Sun¹, Songlin Chen¹, Zhang Wu¹ ¹Nanyang Technological University, Singapore

Failure models with stochastic hazard rates provide more realistic and accurate characterization of systems failure behavior under dynamic and heterogeneous working environments. However, incorporation of stochastic hazard rates results in compound distribution involving integration over random variables, which generally does not have closed form solutions. Using Weibull models with gamma-distributed shape parameters as an example, this paper proposes simulation-assisted method for estimation of failure models with stochastic hazard rates. A simulated log-likelihood function is constructed by approximating the compound failure distribution with statistical sampling. An algorithm based on differential evolution is subsequently developed to implement maximum likelihood estimation through optimization via simulation. The proposed simulation-assisted method has been tested to be accurate in model estimation based on numerical experiments using simulated data.

A Multi-Objective Identical Parallel Machine Scheduling with Setup and Removal Times with Deteriorating and

Learning Effects Alireza Amini¹, Reza Tavakkoli-Moghaddam¹, Fardad Niakan¹ ¹University of Tehran, Iran

This paper considers an identical parallel machine scheduling problem when there are position-based deteriorating jobs with setup and removal times that are affected by the position-based learning effect. The aim of the problem is to minimize the sum of the total tardiness and earliness, minimize the number of tardy jobs and minimize the mean completion times. As a result, the mathematical model is developed for the above-mentioned problem. Since this problem belongs to NP-hard classes, three heuristic methods, namely shortest processing time (SPT), earliest due date (EDD) and longest processing time (LPT), are developed. Furthermore, some numerical experiments are designed to compare the performance of these different methods.

Genetic Algorithms and the Cutting Stock Problem

Mohsin Malik¹, John Taplin¹, Min Qiu¹

¹University of Western Australia, Australia

Most real world cutting stock problems are extensions of the classical cutting stock with non-linearities and added complexities. Application of exact solution approaches is limited in such scenarios but approximate methods such as heuristics and meta-heuristics can give good solutions. However, the optimality of solutions is not guaranteed because the global optimum is unknown. In this paper, genetic algorithms (GA) are used to solve the classical cutting stock problem to extrapolate its performance for bigger and more complex CSP variants.

A Genetic Algorithm Approach for Modelling and Optimisation of MAJSP- Part II:GA Operators and Results Roohollah Milimonfared¹, Romeo Marian¹, Zeinab Hajiabolhasani¹

¹University of South Australia, Australia

This paper, as a continuation of A Genetic Algorithm Approach for Modelling and Optimisation of MAJSP-Part1: Representation, will focus on Multi-Attribute Job-Shop Scheduling Problem (MAJSP). MAJSP is an extension of classical JSP. It represents more realistic scheduling problems since more attributes for jobs are included. The objective is to investigate how the changes in GA operators may affect the optimal fitness value (profit) for algorithms 7011 presented in the previous part. The GA operators presented here include selection and crossover. Since every machine is capable of performing a predefined set of jobs, it is critical to keep in mind that the operators should be designed in a way that feasibility of schedules never becomes violated. The rest of the algorithms are designed according to these assumptions and the results are compared.

Examination of the Effectiveness and Robustness of the Heuristics for Bay-based Quay Crane Scheduling Problem in **Port Container Terminals**

Jiang Hang Chen¹, Stephen Zhang², D.H. Lee¹ ¹National University of Singapore, Singapore ²Pontifical Catholic University of Chile, Chile

The decision of quay crane scheduling problem is crucial for port operators in port container terminals. In this paper, bay-based quay crane scheduling problem is studied and three heuristics designed for the studied problem are identified and their performances (measured both effectiveness and robustness) are examined through a numerical experiment. Herein, the robustness of the solving heuristics is defined as the quality of the methods, as measure by how well the solutions constructed by the methods can offset the adverse impact generated by the randomness of the input. Compared with previous studies in this field, the proposed benchmarking criteria (in terms of both effectiveness and robustness) to evaluate the performance of the heuristics is unique and practical.

Improving Dispatch Operations in Complex Courier Organizations

Laura Paulina Lara Avila¹, Fatos Elezi², Maria Caridi³, Udo Lindemann² ¹Daimler, Mexico

²Technische Universitat Munchen, Germany

³Politecnico di Milano, Italy

Efficient operations are essential for the survival of courier companies in their respective markets. In order to support efficient operations of the courier companies, a methodology for improving the dispatch process is proposed in this paper that incorporates both unitarian and pluralistic approach. In most of the actual operations research (OR), the objective is to develop efficient algorithms for the business models rather than the implementation of these algorithms into the real business environment. This work takes one step further by using pluralistic approach to validate the classic OR approach. The methodology was implemented in one dispatch center of an international courier company. The implementation of the methodology revealed the possibility of reduction of two drivers, which accounts for 80,000€ per year in savings. It is concluded that the proposed methodology not only can provide efficient operations alternatives but also can support the negotiation process with the subcontractors.

Project Management for Small Wind Turbines: an Experimental Survey on Activities, Lead Times and Risks

Marcello Fera¹, Roberto Macchiaroli¹, Salvatore Miranda²

¹Second University of Naples, Italy ²University of Salerno, Italy

In the last years, among the several available renewable Distributed Energy Resources (DER), a growing attention has been paid to small wind turbines (i.e., < 200 kWp). In particular, during the last years the Italian market has been growing up very rapidly (since only 7-10 years ago it simply was not existing while nowadays the total installed power has reached 8 MWp). In such a new market often operations related to commissioning and installing a small wind turbine have to be faced and validated for the first time. The objective of this paper is to summarize the experience of the authors in the application of traditional project management tools in this field to facilitate investors, project managers and stakeholders facing this market for the first time and to offer them a reference timeline in order to plan all financial and field activities.

Composing a Technology Delivery System for an Emerging Energy Technology: The Case of Dye-Sensitized Solar Cells Ying Guo¹, Xuefeng Wang¹, Donghua Zhu¹

¹Beijing Institute of Technology, China

This paper presents an approach to ascertain and represent the key elements and dynamics of a "technology delivery system" ("TDS") for emerging energy technologies. We describe a 10-step analytical process to help characterize the technology, gauge its state of development, and depict the socio-technical system institutions and actors. We apply this analytical process to develop a TDS model for a promising "new and emerging science & technology"-- dye-sensitized solar cells ("DSSCs"). We consider this technology in terms of technological push versus demand pull. We offer a new "cross-charting" method to associate novel nanomaterial-enabled capabilities to functional advantages they might offer, and to link those functions to potential applications. The resulting systems model can help private and public sector decision-makers grasp the key structures and processes and how these can be tuned to enhance the prospects of successful innovation deriving from the emerging energy technology.

Innovation Risk-utility Pathway Method Applied to Dye-sensitized Solar Cells

Ying Guo¹, Xuefeng Wang¹, Donghua Zhu¹ ¹Beijing Institute of Technology, China

New & Emerging Science & Technologies ("NESTs") are increasingly studied by Future-oriented Technology Analysts because of their potentially important "emerging applications." However, the high uncertainty and dynamics of NESTs pose special challenges to traditional forecasting tools. This paper combines methods of risk utility theory and technology path research to explore a new innovation risk-utility pathway modelling method for NESTs development. We illustrate the use of temporal change patterns and leading actor indicators, presenting illustrative results for the development of dye-sensitized solar cells (DSSC).
Full Service Vehicle Manufacturing: Rise and Fall

Alan Pilkington¹, Luciano Ciravegna¹ ¹University of London, United Kingdom

The literature and theory of supplier involvement in the design and manufacture of products in the automotive sector has not kept pace with developments in the industry. We explore the previously undocumented emergence of full service vehicle manufacturers (FSV) which produce finished products for the large manufacturers. The emergence of FSVs is explained using transaction cost ideas as they do not carry the costs of developing engines and power trains and so have been competitive in traditionally marginal markets. FSVs have recently seen a shakeout with some developing whilst others have faltered, and we explain the differing success through a changing focus of capability from design to production once vehicles have become established in the market.

A Prescriptive Approach to Understand Customer Needs Using Value-focused Thinking Xinwei Zhang¹, Guillaume Auriol¹, Claude Baron¹

¹University of Toulouse, France In the paper a prescriptive approach to understand customer needs is proposed, which helps to transform the subjective, human-centric

problem into a more objective, decision-making problem. By recognizing the diversity of levels or granularities of initially identified customer statements, techniques of fundamental objectives hierarchy and means-ends objectives network are utilized to qualitatively structure the customer statements. A set of customer needs suitable for measuring is then identified. By carefully selecting an appropriate measure for each customer need in the set, quantitative value model for conjoint measurement is constructed with multiple attributes preference theory. The implications of quantitative understanding on customer needs in terms of values, e.g. weights and even swap, are further discussed. The business benefit of the approach is the breadth and depth of understanding of customer needs and values.

Investment Center Framework

Romeo G. Manalo¹, Marivic V. Manalo²

¹Manila Electric Company, Philippines

²De La Salle University, Philippines This paper is about a framework that would rationalize the existence of

various organizations within a company and their contribution to the ultimate objective of the firm which is to maximize profit while delighting its customers. The Investment Center Framework (ICF) represents the various stakeholders in a corporation and establishes their relationships. The customer, which is the most important stakeholder, has to be served by the various organizations including government regulatory institutions through the investment centers or front line organizations. The relationships between the investment center and the other stakeholders should be governed by standard processes that are consistent and sustainable yet flexible to changes and new developments in the business environment. What is unique about this set-up is that support organizations like Shared Services Centers (Legal, IT, Finance, Logistics, HR, Marketing, etc) have to compete for the services of third party suppliers to make them more efficient and competitive.

Robustness and Reliability Consideration in Product Design Optimization Under Uncertainty

Xiaotian Zhuang¹, Rong Pan¹, Lizhi Wang² ¹Arizona State University, United States

²Beihang University, China

Robustness and reliability are two important issues to be considered in product design optimization under uncertainty. Robustness is used to counter manufacturing variation and improve product quality, and reliability is used to maintain structure design feasibility by probabilistic constraints. This paper considers robustness and reliability simultaneously by a multi-objective reliability-based robust design optimization (RBRDO) problem. A Pareto frontier optimization strategy is employed to indicate the trade off tendency between two objectives. To enhance the efficiency of RBRDO, a constraint moving approach is proposed to convert probabilistic constraints into deterministic constraints. An I-beam case study illustrating RBRDO framework and applicability is proposed in the paper, the result is a Pareto frontier to trade off robustness and performance value.

System Dynamics Modeling for EFQM Excellence Model:

Case Study of a Regional Electricity Company in Iran Mohammad Dehghani Saryazdi¹, Kazem Noghondarian², Mohammad Saleh Owlia¹, Jamal Hosseini Azabadi²

¹Yazd University, Iran

²Iran University of Science and Technology, Iran

Excellence models, such as European Foundation for Quality Management (EFQM) provide a framework for the self-assessment. The EFQM model consists of two main domains: Enablers and Results. Feedback from the results makes the organization to correct the system. Hence, a dynamic model could be appropriate in analyzing the interrelated behavior of the two main domains as well as those within the criteria and sub-criteria. In this paper, a dynamic model is presented in which the EFQM model items are linked through the causal relation-ships. The case study described in this article is concerned about Yazd regional electricity company in Iran. The advan-tage is that by changing one parameter in the model, one can find how it could affect other parts of the model including the key results. By this analysis, it could be expected that the efficiency of EFQM model would be improved.

Control Chart for Monitoring Dependent Binomial Processes

Tsen-I Kuo¹, Cheng-Shih Lin¹, Tung-Tsan Chen¹, Hsin-Hua Hung¹ ¹National Quemoy University, Taiwan

Many processes data are autocorrelated, and traditional methods may lead to false results. Hence, traditional methods are not appropriate. Attribute control charts for monitoring dependent processes are lacking. Hence, we will investigate attribute control charts for monitoring dependent binomial processes in this study. We evaluate the performance of attribution control charts for monitoring dependent processes by average run length.

System Integration Issues - Causes, Consequences & Mitigations

Adalberto Coelho Silva¹, Geilson Loureiro¹

¹National Institute for Space Research, Brazil

Usually the systems integration in traditional designs is consistently underestimated. The increasing complexity of systems integration poses many challenges to system developers and integrators. During this phase, unexpected and unforeseen issues have rise. Most of these issues are inter organizations/ inter subsystems. When the project gets more complex, with more users, more suppliers, more processes within the company, and more functions and subsystems, the integration phase of the system becomes extremely difficult. System integration involves the combination of products from various sources / companies in a system - it means: interoperability, compatibility. The main purpose of this paper is to analyze the causes, consequences, and possible mitigations for issues found in systems integration.

Process Cascade- and Segmentation-Based Organizational **Design: A Case Study**

Markus Kohlbacher¹, Doris Weitlaner¹

¹University of Applied Sciences CAMPUS 02, Austria

Business process orientation means focusing on the organization's business processes instead of placing emphasis on functional structures or hierarchies. In this paper we discuss the approach of process cascading and segmentation, a design principle which helps organizations to build its structure around its customer-oriented business processes. Cascading of processes is an approach where the organization's business process design is based on internal customer-supplier relationships which ensure that every business process of the organization has a clearly defined (internal) customer which places an order and also receives the results. Segmentation of business processes refers to the idea of creating process variants of business processes which face heterogeneous market and/or customer. Both principles - cascading and segmentation of business processes complement each other. We show how these design principles are applied in practice by using an Austrian manufacturing firm as a case study.

Determining Economic Manufacturing Quantity, the Optimum Process Parameters Based on Taguchi Quadratic Quality Loss Function Under Rectifying Inspection Plan

Ismail Al-Me'raj¹, Yahya Cinar¹, Salih Duffuaa¹ ¹King Fahd University of Petroleum and Minerals, Saudi Arabia

The problem of determining the optimal economic manufacturing quantity and the optimal process parameters is an important problem in production and quality control. This problem has been addressed by Chen and Lai using profit maximization as a criterion to obtain the optimal manufacturing quantity and the mean of the process. In this paper Chen and Lai has been extended to determine the optimal manufacturing quantity, the mean and the variance of the process and the specification limits using rectifying inspection. The simulated annealing approach has been applied to obtain the optimal solution. The utility of the model is demonstrated via a realistic example. The model developed can be utilized to determine the optimal economic manufacturing quantity and process target simultaneously and is expected to provide more insights in managing this important problem.

Identifying Quality Improvement Opportunities in a Manufacturing Enterprise Stanley Fore¹

¹Cape Peninsula University of Technology, South Africa

Quality management has gained paramount importance in the manufacturing process. The emphasis on reduction of quality costs for analysis of alternatives in productivity improvement is increasing. Business today requires quality throughout the value chain. At the case study company , there is an ineffective quality management system with very little quality control and monitoring of activities thus leading to an average of 16% of the production hours being attributed to reworks, re-inspection, scrap and waste, hence impacting negatively on productivity. Due to final product inspection, reworks, re-inspection, scrap and waste have been on the increase within the production processes. The paper investigates the quality issues that are negatively impacting on productivity using a qualitative approach. Measures to improve quality are suggested resulting in productivity improvement. Some of these measures include training employees, and adoption of quality tools such as statistical Process Control amongst others.

An EWMA –Based Method for Monitoring Polytomous Logistic Profiles

Hamidreza Izadbakhsh¹, Rassoul Noorossana¹, Marzieh Zarinbal², Amir Zarinbal³, Mohammad Reza Safaian⁴, Majid Chegeni⁵ ¹Iran University of Science and Technology, Iran ²Amirkabir University of Technology, Iran ³University of Waterloo, Canada ⁴Expert of Water and Wastewater Company, Iran ⁵Azad Islamic University, Iran

In certain statistical process control applications, quality of a process or product can be characterized by a function commonly referred to as profile. Some of the potential applications of profile monitoring are cases where the quality characteristic can be modeled using dichotomous or polytomous variables. Polytomous variables, especially ordinal variables, have various applications. An ordinal (or ordered) variable is a categorical variable whose values are related in a greater/lesser sense. In this paper, we proposed three methods for monitoring a profile when the process/service output is an ordinal response variable. Ordinal logistic regression (OLR) provides the basis for our profile model. Three methods including chi-square statistics, exponentially weighted moving average (EWMA) statistics, and combination of these two statistics are proposed to monitor OLR profiles in phase II. The performances of these three methods are evaluated by average run length criterion (ARL).

Session	E-Business and E-Commerce
Date	Fri, 9 Dec
Time	08:30 - 10:30
Room	Venus I
Chairs	Charles Mbohwa, Pei-Lee Teh

A Procurement Model in an Electronic Market with **Coordination Costs**

Jishnu Hazra¹, B. Mahadevan¹ ¹Indian Institute of Management, India

Electronic markets provide an alternative channel for industrial procurement. Some argue that number of suppliers selected for award of contract could increase several others predicted that the number of suppliers will be fewer. We investigate this issue by modeling the procurement process in an electronic market. Our results show that inclusion of coordination costs in the analysis is significant in the decision-making framework. We find that variations in supplier capacities do not significantly affect the optimum number of suppliers when there are costs of coordination. Furthermore, we also show that managers do not gain much by pre-qualifying a large pool of suppliers to participate in the procurement process.

E-business and E-commerce Applications and Trends in the **Retailing Sector in Zimbabwe**

Charles Mbohwa¹, Batanai Sammie² ¹University of Johannesburg, South Africa

²University of Zimbabwe, Zimbabwe

This paper discusses e-commerce adoption trends in the Zimbabwean retail sector. Data were collected using questionnaire and interviews of 170 retailers and 73 customers selected in Harare. Zimbabwe's retail sector lags behind in e-business adoption. Key e-commerce applications were in administration, accounting, management and control systems with barcode-driven systems and debit card swipe technologies being most common. Mismatch between the demand for e-business solutions by customers and the supply of such solutions by retailers and a pronounced digital divide between multiple store and single store retailers in the areas of network technologies were identified. The impact of e-business on business processes and company productivity is positive for multiple store and minimal for single store operators. Internal work organisation, procurement costs of supply goods and quality of product and services impacts are minimal. Scope exists for improved adoption and development of e-business for Zimbabwean retailers through better policies and supportive legislation.

MOA and TRA in Social Commerce: An Integrated Model

Pei-Lee Teh1, Pervaiz Khalid Ahmed2

¹Multimedia University, Malaysia ²Monash University, Malaysia

The growth of social commerce and social shopping communities have changed the nature of online shopping and human social interaction. However, relatively little work has been conducted to study the motivational factors affecting the individuals' social commerce behavior. Drawing from both Motivation, Opportunity and Ability Theory (MOA), and Theory of Reasoned Action (TRA), this paper examines the influence of motivation, ability and opportunity on social commerce adoption. Survey questionnaires are personally-administered to 220 university students. Results indicate that individuals' behavioral intention to use social commerce is predicted with higher levels of motivation, ability and normative belief. Individuals' behavioral intention to use social commerce also significantly affects the individuals' actual social commerce behavior. This paper concludes with a discussion of research implications and new directions for future studies in the field social commerce.

The Effects of Psychological Factors on Online Consumer **Behavior**

Shu-Hsien Liao¹, Yu-Chun Chung¹ ¹Tamkang University, Taiwan

The topic of online consumer behavior has been examined under various contexts over these years. Although researchers from a variety of business disciplines have made significant progress over the past few years, there are very few studies that directly investigate the relationship between psychology and online consumer behavior. In view of this, this study provides a review of the relevant empirical literature and proposes a research framework. This proposed framework not only provides us with a cohesive view of the relationship between psychology and online consumer behavior, but also serves as a salient guideline for researchers in this area. This study concludes with a research agenda for the study of the relationship between psychology and online consumer behavior.

The Research on Relationships between Customers' Perceived Value and Repurchase Intention

Yiming Xiang¹, Lili Li², Xin Zhong³ ¹ZheJiang Gongshang University, China ²the University of Manchester, United Kingdom ³the University of Bridgeport, United States

The extent literature on customers' repurchase intention has provided little insight from customers' perceived value of website. Based on TAM, the theory of repurchase intention and the theory of customers' perceived value, the model proposes switching costs, belief and perceived usefulness of website as customers' perceived value that determine customers' repurchase intention. The proposed model is empirically tested by using data collected from a survey of 287 customers. Results show that switching costs, trust and perceived usefulness of website have positive effect on customers' repurchase intention. Finally, the findings provide understanding of the factors that measured repurchase intention success. At last, important theoretical and practical implications of these findings are discussed.

Information Architecture for Online Review System

G. Rajesri¹, P. Laras Ayutirta¹ ¹Bandung Insitute of Technology, Indonesia

This paper is intended to develop a comprehensive online review system design comprising of (a) what information should be shown and (b) what information should be collected from reviewer. Information/features in best practice online review template from Yahoo Developer Network and other 3 e-commerce websites are discussed and analyzed using 5W1H to be then included in the information architecture. Moreover, this study also presents two related policies that could be implemented in order to ensure that the collected information from reviewer is not manipulated and to increase the intention to provide online review. Those policies, together with the information architecture, were validated using expert evaluation and the result showed that the online review system designed based on the information architecture and policies helps to provide important information needed for comprehensive evaluation.

DMTT - An Approach for Business Document Mapping and Transformation in B2B Collaboration

Wen Jing Yan¹, Chong Minsk Goh¹, Puay Siew Tan¹, Valliappan Ramasamy¹ ¹Singapore Institute of Manufacturing Technology, Singapore

Business documents are frequently exchanged between business entities as well as within the enterprise. In the context of dynamic business to business (B2B) collaborations, where partnerships are formed in an ad-hoc manner, the relationships between the elements of these documents are often unknown to each. To translate the information from a document to another, a mapping and transformation of these elements are required. To identify the possible mappings automatically, a matching is performed. In the matching of business documents, one of the challenges identified is matching the multi-word used to define the element names. Our contributions in this paper are two folds. Firstly, we proposed an algorithm to address the matching of multi-word in XML business documents using their corresponding XML Schemas. Secondly, we proposed Document Mapping and Transformation Tool (DMTT), a solution to the mapping and transformation of XML business documents. DMTT employed combined matching techniques to derive the recommended correspondences of XML schemas with the consideration of both element and structural aspects of schemas.

Influencing Factors of Consumer Intention towards Web Group Buying

Guobiao Xie¹, Jie Zhu¹, Qiang Lu¹, Suxiu Xu¹

¹Harbin Institute of Technology, China

In this paper, based on the technology acceptance model (TAM) we explore the influencing factors of consumer intention towards web group buying. We took back 224 questionnaires. The samples are students and staff in the company, who are the typical web group buying consumers. We use correlation analysis and regression analysis to analyze the questionnaire data and test the hypothesis model. The results show that perceived risk does not have a significant impact on customer intention; however, electronic Word-of-Mouth (eWOM) and discount would influence the intention through changing consumers' perceived usefulness and subjective norm.

Session	Manufacturing Systems (2)
Date	Fri, 9 Dec
Time	11:00 - 13:00
Room	Venus I
Chairs	Elesandro Baptista

A Two-Stage M/G/1 Queue with Discretionary Priority

Zhaotong Lian¹, Ning Zhao² ¹University of Macau, China

²*Kunming University of Science and Technology, China*

In this paper, we study a two-stage M/G/1 queue with discretionary priority. We construct an imbedded Markov model for specific time points on the time axis. By investigating the embedded Markov chain, the marginal queue length distribution, mean queue length and mean waiting time can be figured out. As the special cases, the exponential, constant and triangular service times are considered.

Heuristic Algorithm for Two-sided Assembly Line Balancing Problem with Multi-objectives

Xiaofeng Hu¹

¹Shanghai Jiao Tong University, China

This paper proposes a heuristic algorithm for two-sided assembly line balancing problem to minimize line length and smoothness index. First, the branch-and-bound algorithm is adopted to find the solution with minimal line length. Then, the station neighborhood is defined. With the constraints of the line length, precedence and operational directions, some tasks are reassigned by comparing the loads of stations in the neighborhood to minimize the smoothness index. Finally, an example is used to show the procedure of the proposed algorithm, and the better solution is obtained.

Considering Decision Maker Ideas in Product Mix Problems by Goal Programming

Fahimeh Tanhaie¹, Nasim Nahavandi¹

¹University of Tarbiat Modarres, Iran

Theory of Constraints is an approach to production planning and control that emphasizes on the constraints to increase throughput. One of the applications in theory of constraints is product mix decision. This paper presents an alternative approach by using a goal programming to determine the product mix of the manufacturing system. The objective of this paper is to provide a methodology in order to make product mix decision. The key point of the proposed methodology is to allow decision makers to determine the importance of throughput and bottleneck machines via pair-wise comparison. Through an example, the inefficiency of theory of constraints in multiple bottleneck problems has been shown. Comparison of theory of constraints, linear programming and other methods has also been discussed to show the advantages of proposed method.

Optimization of Multi-skilled Operator Allocation to Minimize Inventory Waiting Time

Adam Brown¹, Fazleena Badurdeen ¹University of Kentucky, United States

Operator allocation is a key aspect of manufacturing with both direct and indirect implications on system performance. Resource capacity must be managed carefully while still considering human factors like probability of operator error, job satisfaction, and worker (and skill) retention. In many cases human resources are flexible in their ability to handle various types of jobs, and this condition is favorable because it makes the system more robust in the face of disruptive events. Unfortunately, the benefits of worker flexibility may not be fully understood or utilized on account of the many sources of variability that exist and confuse the outcome of worker allocation decisions. The purpose of this work is to quantify the effect of varying rework rates of differently-trained employees working on multiple products. Subsequently, the time that inventory spends waiting in queue is minimized through optimization of worker placement.

Application of Data Mining Techniques to Monitor the

Network-controllable Robot's Performance James Yongjin Kwon¹, Yongmin Park¹, Jungwan Hong¹

¹Ajou University, South Korea

This study presents the data mining techniques to monitor and classify the network-controllable robot's performance. The robot is a part of the networked production system, which can be accessed and controlled via the Internet. In this study, the robot's repeatability is the main focus of the performance variables, of which being gauged with the use of a networked vision system and a precision calibration grid. The collected data are analyzed and made available over the network. The ability to monitor and analyze the robot's important performance variables presents many benefits. For example, the remote operator can decide whether the robot is suitable for a new assembly task. The data mining techniques utilized in this study effectively classify the repeatability data. The visual display of classification results is also presented.

Average Flow Time Estimation of Jobs in a Flexible Manufacturing Cell Consisting of a Number of Identical Machines

Jannes Slomp¹, Jos A.C. Bokhorst¹, Rahul Caprihan² ¹University of Groningen, Netherlands

²Dayalbagh Educational Institute, India

This paper concerns the estimation of flow times of jobs to be produced in a Flexible Manufacturing Cell (FMC) consisting of a number of identical machines. An analytical expression is derived from a careful analysis of the elements of the flow time. Next, a simulation study is performed which mimics reality and serves as a reference for the comparison with analytical results. As a conclusion, we argue that the analytical expression serves well to predict FMC flow time performance. Analytical predictions of flow times are important for investment decisions and for setting lead times of jobs.

Numerical Simulation and Experimental Verification of Electrode Life for Different Coolants and Its Flow in Plasma Cutting Torch

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The plasma arc cutting technology is the one, which finds tremendous potential in fabrication and manufacturing industries. The objective of this work is to improve the life of the electrode, which is used in plasma cutting torch as consumable. There are many factors which influences over the electrode life, one such factor affecting the life drastically is overheated plasma system. To increase the life, proper cooling is necessary to cool the system. The results of numerical simulation as well as the experimental outcome due to the effect of different plasma coolants with different flow rates are presented. The thermal behavior, due to three coolants, propylene glycol, ethylene glycol and de ionized water, are analyzed using the CFD tool, FLUENT. It has been experimented with different coolant flow rate to find the effect of flow rate, it confirms an optimized coolant flow rate is required to achieve the better electrode life.

An Events-driven Scheduling Algorithm for Two-cluster Tools with Processing Time Windows

Xin Li¹, Richard Y. K. Fung¹, Hongyi Sun¹

¹City University of Hong Kong, China

This paper discusses a scheduling problem of two-cluster tools for multi-type wafers with processing time windows. Firstly, a decomposition method is used to decomposes the two-cluster tool into three reduced single-cluster tools (RCT). Then, an events-driven algorithm, based on the temporal constraint sets, is proposed for the reduced single-cluster tool with the objective of minimizing the time for completing a newly arriving wafer. The algorithm deals with the two-cluster tool situation while the three reduced single-cluster tools are composed again. The procedures are repeated for each arriving wafer. Simulation experiments indicate that the proposed algorithm is effective and practical in scheduling two-cluster tools under time constraints.

An Efficient Tabu Search Approach to Determine Cell Formation Problem with Consideration of Cell Layout Chia-Ching Lin¹, Chin-Chih Chang², Feng-Chia Li²

¹Yu Da University, Taiwan

²Jen-Teh Junior College of Medicine, Nursing and Management, Taiwan

In this paper, a mathematical model is formulated to integrate cell formation and cell layout simultaneously with considerations of alternative process routings, operation sequences, production volume and different cellular layout type. Due to the combinatorial nature of cell formation problem and cell layout problem, an efficient tabu search (TS) approach has been proposed to address these issues. Several test instances from the literature are employed to illustrate the effectiveness of the proposed solution algorithm. Computational experiences from test problems show that the proposed approach is extremely effective and efficient. When compared with the mathematical programming approach which took 34 hours to solve problems, the proposed algorithm is able to produce optimal solutions in less than 1 second. These comparisons show that the proposed approach is very effective, efficient and practical.

Session	Quality Control & Management (2)
Date	Fri, 9 Dec
Time	08:30 - 10:30
Room	Venus II
Chairs	Jianjun Wu, Zhang Wu

Optimization of Multiresponse Problems using Process Capability Index for Batch Manufacturing Processes Amirhossein Amiri¹, Mahdi Bashiri¹, Hamed Mogouie¹

¹Shahed University, Iran

In this paper a new method in multi response experimental design is proposed to determine the optimal settings for controllable factors, where the responses are uncorrelated. This method leads to improving the quality characteristic with the lower process capability index (PCI) with more priority. Due to the application of this study in a batch manufacturing and existing of some parts in each treatment, PCI has been computed for each treatment for every initial response. Then an aggregated index (ci) has been computed by TOPSIS based on the calculated signal to noise ratios of PCI's. Finally the optimal controllable factors have been determined by optimizing a fitted linear regression to the aggregated index and values of controllable factors. The proposed method is illustrated by a real case study in a plastic molding factory. The results show the effectiveness of the proposed method in improving the quality characteristic with the lowest cpk.

Implementation of Environmental Management in the Austrian Transport Sector – Do Manager's Attitudes Matter?

Elmar Furst¹, Peter Oberhofer¹

¹Institute of Transport and Logistics Management, Austria

Environmental management has become an important business topic throughout the last decade. Road transport is, in this respect, still regarded to be one of the main sources of greenhouse gas emission. In this paper we discuss the implementation of environmental management based on a survey of Austrian transport for hire or reward companies or businesses in other fields regularly performing own account transport and investigate the importance of managers' attitudes.

Email Network Analysis for Leadership

Hisato Tashiro¹, Antonio Lau¹, Junichi Mori¹, Nobuzumi Fujii², Yuya

Kajikawa¹

¹The University of Tokyo, Japan

²Waseda University, Japan

Seventy two middle managers' performance evaluation of a case global TQM manufacturer were statistically compared with the email network centralities. Betweenness and In-degree network centralities of the middle managers are correlated with their leadership performance, and, on the other hand, PageRank is a negative indicator of leadership. Genuine leaders are trusted in their communities as a hub of information channel of the communication network.

TQM Organizational Development for a Global Manufacturer

Kiyoshi Suzuki¹, Hisato Tashiro², Nobuzumi Fujii³, Masayoshi Ushikubo¹, Ichiro Sakata²

¹Sanden Corporation, Japan

²The University of Tokyo, Japan

³Waseda University, Japan

The essence of rapid growth of the global manufacturer is a series of actions to accumulate daily effort of creative improvement, while improving the quality of each management and each result, in order to build the company which prospers in the 21st century. In this paper, we introduce a TQM organizational development plan of a global manufacturing company. One of the authors won the Deming Prize for Individuals in 2007 for his efforts in TQM globalization and has led the global organization to win quality awards, including the Award for World-Class Total Productive Maintenance Achievement, Japan Quality Medal, and several Deming Application Prizes.

Process Capability Analysis for Non-normal Distribution with Lower Specification Limit

Duygu Korkusuz¹, Hendry Raharjo¹, Bo Bergman¹

Chalmers University of Technology, Sweden

Process capability analysis is an important element of any quality improvement initiative. However, estimating process capability is often problematic when it comes to non-normal distributions since the conventional methods sometimes give misleading results. In this paper, a new method for estimating process capability of non-normal distribution with only lower specification limit is proposed. The proposed method only considers the left tail of the distribution rather than taking all of the data points. For estimating the process capability, it employs least squares technique and normal approximation to the selected observations from the left tail. Here, the proposed method is only tested on lognormal distribution. Simulations and real-world data analysis are used for verification and validation purpose, respectively. An easy and practical guideline is also developed.

Synthetic-np Chart for Attributes

Salah Haridy¹, Zhang Wu¹

¹Nanyang Technological University, Singapore

While the np chart is powerful for detecting large shifts in fraction nonconforming p, the synthetic chart is more effective for detecting small p shifts. In this article, the salient features of the np chart and synthetic chart are hybridized to produce the Syn-np chart. The results of the performance studies indicate that the new Syn-np chart significantly outperforms the np chart and synthetic chart by 73% and 31%, respectively, in terms of Average Number of Defectives (AND) across a wide range of p shifts under different circumstances.

Controlling Non-conformities Propagation in Manufacturing. Case Study in an Electromechanical Assembly Plant

Valerie Fiegenwald¹, Samuel Bassetto², Michel Tollenaere¹ ¹Laboratoire GSCOP, France

²Ecole Polytechnique de Montreal, Canada

The purpose of this paper is to control the propagation of non-conformities. The control methods implemented to ensure the quality performance of a production system present weaknesses, inherent to their constitution, which can let non-conformities propagate along the value stream. This propagation cannot be avoided, but it can be mastered. This paper presents a method to master non-conformities propagation in a production system by building the associated control chart. In order to calibrate the proposition, a case study on non-conformities propagation in a low-volumes industry in the energy field is presented. The simulation of the proposed plan shows the benefits of controlling this indicator.

Session	Quality Control & Management (3)
Date	Fri, 9 Dec
Time	11:00 - 13:00
Room	Venus II
Chairs	Ayon Chakraborty, Mahdi Bashiri

Profile Monitoring for Poisson Responses

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In some real case problems, the relationship between a response variable and one or more explanatory variables called as profile should be monitored over time instead of the quality characteristic itself. Profile monitoring is used in such instances. Many researches have been done in the area of profile monitoring but in most of them it is assumed that the response variable follows normal distribution. In recent years Yeh et al. (2009) proposed 5 T2 based methods for monitoring logistic profiles in which response variable is binary. In this paper we evaluate two of the best T2 methods for Poisson response profiles monitoring in Phase I.

The Effect of an Additional Observation on Covariance Structure

Maman Djauhari¹

¹Universiti Teknologi Malaysia, Malaysia

We propose a statistic for measuring the effect of an additional observation on covariance structure. Its exact distribution will be derived and for practical purpose a chi-square approximation will be presented. An application in multivariate process variability monitoring based on individual observations will be discussed. A simulation study indicates that its performance in detecting the shift of process variability is quite promising.

Effect of Seemingly Unrelated Regression-based Modeling Approach on Solution Quality for Correlated Multiple **Response Optimization Problems**

Sasadhar Bera¹, Goutam Barman¹, Indrajit Mukherjee¹ ¹Indian Institute of Technology, India

Multiple response optimization remains a critical and important research area in quality engineering and management. Various methodologies have been proposed to resolve a correlated multiple responses optimization problem. However, very few address the importance of empirical response surface modeling and its influence on the optimal solution quality. In this paper, two different approaches of empirical modeling, using multiple regression, viz. ordinary least square (OLS), and seemingly unrelated regression (SUR) are selected for study. To compare the approaches, two different metaheuristic optimization strategies are used, viz. ant colony optimization in real space (ACOR) and Honey Bee Optimization algorithm (HBO) for a given case situation. Two different cases illustrate that SUR-based response surface models provide significantly better solution than OLS approach for correlated multiple response problems.

Heuristic and Metaheuristic Structure of Response Surface **Methodology in Process Optimization**

Mahdi Bashiri¹, Farshid Samaei¹

¹Shahed University, Iran

Response surface methodology is a sequential process that the control variables are optimized and used in experimental design. But according to the characteristics of the method may be stopped at the local optimal region. In this article two innovative methods to improve RSM performance are presented. The proposed methods reduced the possibility of stopping in the local optimal region and improved performance of number of runs. These methods are based on checking the convexity of response surface. For evaluation of the proposed approaches, a simulated process has been analyzed. Numerical analysis shows better performance of proposed approaches than the basic response surface methodology.

The impact of Tolerance Limit on Cost of Quality

Mohamed K. Omar¹, Sharmeeni Murugan², Rohana Abdullah³ ¹Nottingham University Malaysia, Malaysia ²Multimedia University Melaka (MMU), Malaysia ³Universiti Teknikal Malaysia Melaka, Malaysia

In this paper, the recommended extensions by Chiadamrong [1] was successfully adopted and significant modifications was proposed when computing costs of quality model in a manufacturing system In the literature shows that there is strong connection exist between the tolerance designs with the quality characteristic of a product and the cost associate in achieving the specific quality of the product. With the intention of utilizing the reciprocal power model in determine the relation between the tolerance and the cost, the tolerance has to be converted and set to a standard value at different confidence level. The proposed costs of quality model was tested using real life data obtain from the industry and through simulation works, the results was generated.

Decision-making in Process Design Based on Failure Knowledge

Wei Dai¹, Jun Yang¹ ¹Beihang University, China

Decision-making in process design is an indispensable stage in product development. A novel decision-making method is presented that draws upon the failure knowledge of scenarios. An ontological expression of failure scenarios is presented together with a framework of failure knowledge network (FKN). According to the roles of Quality characteristics (QCs) in failure processing, QCs are set into three categories, which present the monitor targets, control targets and improvement targets respectively for quality management. A mathematical model and algorithms based on the Analytic Network Process (ANP) is introduced for calculating the priority of QCs with respect to different development scenarios. A case study on propeller improvement is provided according to the proposed decision-making procedure based on FKN. This methodology is applied in the propeller design process to solve the problem of prioritizing QCs. This paper provides a practical approach for decision-making in product quality.

Economic Process Control for Multivariate Quality Characteristics with Hotelling's T-squared Charts under Gamma Shock Model

Feng-Chia Li¹, Peng-Kai Wang², Li-Lon Yeh², Sheng-Wen Hong² ¹Jen-Teh Junior College of Medicine, Nursing and Management, Taiwan ²Hwa Hsia Institute of Technology, Taiwan

This study is an extension of research conducted by Rahim and Banerjee (Journal of Naval Research Logistics 40 (1993), pp.787-809) to construct an economic design approach of control chart for simultaneously monitoring several quality characteristics under a Gamma shock model with an increasing failure rate. Furthermore, measure the advantage of the Hotelling's T2 control chart with a variable sampling interval (VSI) versus a fixed-length sampling interval (FSI) and a standard Shewhart sampling interval (SSI) under Gamma $(\lambda, 2)$ shock models based on an economic aspect. This primary contribution of this study is to find an optimal sampling interval to improve the traditional Hotelling's T2 control chart under a non -exponential failure mechanism detecting the small process shift from considering the cost viewpoint. As a result in earlier investigations most control chart economic designs assumed the occurrence time of an assignable cause, which belongs to a random variable of exponential distribution with constant hazard rates because of their administrative simplicity. However, it may not be appropriate for some processes which deteriorate over time. Hence, this study employs a numerical example to indicate the solution procedure and to implement the sensitivity analysis while comparing the results of using various sampling interval approaches.

Session	Reliability and Maintenance Engineering (1)
Date	Fri, 9 Dec
Time	08:30 - 10:30
Room	Iupiter I
Chairs	Om Prakash Yaday, Jayantha Prasanna Liyanage

Integration of Maintenance Stategies for Improved Asset **Reliability and Availability**

N. K. K. Prasanna¹, Shakti Akula¹, Tushar N. Desai²

1Reliance Industries Ltd., India

²National Institute of Technology, India

The simplicity and ruggedness of erstwhile 'equipment sufficed maintenance' used to revolve around preventive and run-to-failure methodology. With advancement in technology and arrival of complex machinery, the operational and maintenance philosophies have machinery, the operational and maintenance philosophies have changed. Many maintenance management concepts, such as Reliability Centered Maintenance (RCM), Total Productive Maintenance (TPM), Total Quality Management (TQM) each having its own merits and demerits, have emerged. This necessitates the development of an integrated maintenance strategy which combines the available methodologies to arrive at the right combination which will give maximum returns in the form of increased safety, reliability & availability at optimum cost. This paper deals with the integration of various maintenance methodologies to arrive at an integrated maintenance strategy with a case study of a vertical integrally geared high speed pump.

Increasing Availability of Production Systems in Robust Layouts via Assignment of Maintenance Resources

Majid Bazrafshan¹, Shahrzad Nikghadam¹, Shaomin Wu²

¹University of Tabriz, Iran

²Cranfield University, United Kingdom

The trend toward increased maximum machine utilization has forced the managers to pay more attention to maintain the equipments. The subject of maintenance managements is to implement reliable/available systems. Regarding the cost effects of Work-in-Processes (WiP), manufacturers try to reduce/remove them from their production systems. Robust layout is a noble well-known layout for manufacturing systems that reduced amount of work-in-process is one of its characteristics. Since a failure can idle an entire production system, WiPs has been proven to highly affect the effectiveness of maintenance systems. Due to the reduced amount of WiP's, structure of maintenance system should be taken into account for keeping machines and equipments in an available state. The effectiveness of maintenance system on increasing availability can be improved via allocation of spare parts and other maintenance resources required for the service of facilities. Given this, a new maintenance assignment model is presented for a robust layout.

Reuse Oriented Group Maintenance Scheduling Based on Hybrid Genetic Algorithm and Tabu Search

Jihong Yan¹, Dingguo Hua¹, Zimo Wang¹

¹Harbin Institute of Technology, China Reuse of facilities can bring manufacturers not only less investment but also green images, whereas it requires much maintenance to guarantee the reusability of facilities, which could lead to higher maintenance cost and more production lost. In this paper, a preventive maintenance scheduling method for complex series-parallel system is proposed scheduling method for complex series-parallel system is proposed under group maintenance policy utilizing intelligent algorithms. Hybrid Genetic Algorithm (HGA) and Tabu Search (TS) are employed and compared in terms of time complexity and effectiveness. A case study is then presented. It is verified that group maintenance policy can enhance the reuse of facilities as well as reduce maintenance cost and production lost in the long run. In addition, it can be concluded that HCA is more affective but more time comparing compared with that HGA is more effective but more time consuming compared with TS.

State Space Model Based Reliability and Sensitivity

Analysis for Multistage Manufacturing Process Faping Zhang¹, Aiqing Chen², Hong Jing³, Yan Yan¹, Hanbo Qian⁴ ¹Beijing Institute of Technology, China

²Jiaozuo Normal College, China

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⁴Center of Coordination & Support of Costind, China

Quality is an important aspect of any manufacturing process. The stability of process is definitely one of the most important aspects to insure the quality of the machined part stably. Now it is still a challenge to put forward a useful model to deal with manufacturing process stability mathematically. This paper deals with the issue by the notion of manufacturing process reliability and its sensitivity. Based on state space model, process performance function which is used to describe the relations between key product characters (KPC) and key control characters (KCC) during machining process has been conducted. Furthermore, measurement index to process reliability is put forward, which leads the ways to calculate the process reliability mathematically. To determine the weakness during machining process,

process reliability sensitivity has been put forward and the corresponding ways how to get its magnitude. Finally, A simple 2-D case study has been used to support and validate the proposed model. It shows that this way can calculate the process reliability effectively.

Software Reliability Modelling and Optimization for Multi-release Software Development Processes

Qingpei Hu¹, P. Rui², Min Xie², S.H. Ng², Gregory Levitin³

¹Chinese Academy of Sciences, China

²National University of Singapore, Singapore ³The Israel Electric Corporation Ltd., Israel During the lifespan of large software systems, iterative development procedure is commonly adopted with continuously incremental software versions released to the market. When to release each version plays an important role for balancing the competition in market and the risk of low-quality software. Without the loss of generality, a specific iterative software development scenario is considered, where a software development team development schultered where a software development team develops, tests and releases software version by version. A modeling framework is proposed to study the expected number of remaining faults in each version. Cost model is then proposed, and cost oriented optimal release time analysis for n versions is studied. A numerical example is given for the illustrative purpose.

Multi Up-gradation Software Reliability Growth Model with Faults of Different Severity

Amir Hossein Soleiman Garmabaki¹, Anu.G Aggarwal², Pramod Kumar Kapur²

¹Islamic Azad University, Iran

²University of Delhi, India

In today's environment of global competition where each company is trying to prove itself better than its competitors, software company have to continually do up-gradation or add-ons in their software to survive in the market. Each succeeding up-gradation offers some innovative performance enhancement or some new functionality etc distinguishing itself from the past release. But at the same time the amount of risk involved in up-gradation/add-ons of software with regard to introducing new faults or increasing the fault number in the software is also formidable. This model categorizes faults in two types: Type-1 and Type-2(simple fault, hard fault namely) with respect to time which they take for isolation and removal after their observation. In this paper, we propose new model and new concept of multi release software development environment. The model developed is validated on real data sets for software which has been released in the market with new features.

Performance-based Burn-in for Products Sold with Warranty

Zhisheng Ye¹, Loon Ching Tang¹, Min Xie¹ ¹National University of Singapore, Singapore

To protect users from early failures, manufacturers often use burn-in to screen out weak units are meanwhile provide warranty to customers. Some performance-based burn-in models have been proposed in the literature. However, relations between these indices are not clear. In this study, we look into this problem and reveal the internal relations between these indices. More specifically, we focus on the probability of failure within the warranty period, mean number of failures within the warranty period and the percentile residual life that maximize the warranty period given a specified proportion of field failure. It is found that there are some dual relations between these indices. An illustrative example is used to demonstrate our results.

System Dynamics Simulation for Constructing Maintenance Management of Ship Machinery

Dhimas Handani¹, Kenji Ishida¹, Shintaro Nishimura¹, Surya Hariyanto¹ ¹Kobe University, Japan

Operation of a safe ship relies on the success of occupied operating system. This paper shows a model of reliability analysis in System Dynamics (SD) simulation in order to recognize potential failure and prevent functional failure of maintainable items of ship machinery components. The simulated machinery component is the pump which is operated in cooling system of main engine, lubricating oil system and fuel oil system. Output of simulation is probability and consequence of failure for risk prioritization of maintainable items. This model realized that each component has a substantial influence on overall system reliability. Risk prioritization subsequently is important for maintenance management to obtain reliable ship operation. Total cost, which is comprised of operation cost, maintenance cost and penalty cost, is minimized. The proposed model reduces total pump operation cost by forecasting reliability index (RI) of maintainable items in its operation time cost provided. items in its operation time so penalty cost can be avoided.

Session	Reliability and Maintenance Engineering (2)
Date	Fri, 9 Dec
Time	11:00 - 13:00
Room	Jupiter I
Chairs	Faping Zhang, Qingpei Hu

Reliability of Surveillance Mission with Unmanned Aerial Vehicles

Kien Ming Ng1, Jun Jiang1, Rui Peng1, Kim Leng Poh1, Kwong Meng Teo1 ¹National University of Singapore, Singapore

This paper has modeled the reliability of surveillance mission with unmanned aerial vehicles (UAVs). In order to surveil a number of targets, some UAVs can be assigned to visit the targets. It is assumed that if a UAV is shot down during the mission all the targets assigned to the UAV cannot be surveilled. The mission is regarded as successful if all the targets are assigned and successfully surveilled. An optimization framework is presented to solve the UAV routing plan with the consideration of mission reliability.

Reliability-based Robust Design Optimization: A Comparative Study

Vijay Rathod¹, Om Prakash Yadav², Ajay Pal Singh Rathore¹, Rakesh Jain¹ ¹Malaviya National Institute of Technology, India

²North Dakota State University, United States

Reliability-based robust design optimization (RBRDO) is one of the most essential tools developed in recent years to improve the quality and reliability of the products at an early design stage. This paper presents a comparative study of different formulation approaches of RBRDO models and their performances. The paper also proposes an evolutionary multi-objective genetic algorithm (MOGA) to one of the promising hybrid quality loss functions (HQLF)-based RBRDO model. The enhanced effectiveness of the RBRDO model is demonstrated by optimizing suitable example.

Exploring Impacts of Single Failure Propagation between SCADA and SUC

Cen Nan¹, Irene Eusgeld¹ ¹ETH Zurich, Switzerland

Critical infrastructures (CI) deserve increased attention as our societies simply rely on most of their goods and services they are expected to continuously supply. The study of the interdependencies within and among CI is an emerging research field since modern CI are becoming increasingly vital as well as automated and interlinked in complex ways to maintain their daily operations. A failure within any CI or even loss of its continuous service may be damaging enough to society and economy while cascading failures across boundaries have the potential for multi-infrastructural collapse with unprecedented negative consequences. In this paper, the interdependencies between Industrial Control Systems (ICS), in particular SCADA (Supervisory Control and Data Acquisition), and the underlying System Under Control (SUC) are explored and studied using advanced model/simulation techniques. A single failure propagation experiment that analyzes a typical substation of the Electricity Power Supply System (EPSS), comprising components from both SUC and SCADA is developed to visualize the propagation of cascading events across boundaries and evaluate negative impacts on the service availability of the system due to interdependencies related problems.

Human Factor in Maintenance Performance Measurement

Diego Galar¹, Christer Stenstrom¹, Aditya Parida¹, Rupesh Kumar¹, Luis Berges²

¹Lulea University of Technology, Sweden

²University of Zaragoza, Spain

The maintenance performance measurement is often faced with a lack in knowledge about the real function of the maintenance department within organizations, and consequently the absence of appropriate targets emanating from the global mission and vision. These facts bring about metrics not adapted to the real needs, which has a strong load of human factor and without a roadmap of the amount of data to be collected, their processing and use in decision making.

This article proposes a model where qualitative and quantitative methods are combined in order to complement advantages and disadvantages of them both.

A Maintenance Service Contract for A Warranted Product Hennie Husniah¹, Udjianna S. Pasaribu², Abdul Hakim Halim², Bermawi Iskandar²

¹Bandung Institute of Technology, Langlangbuana University, Indonesia ²Bandung Institute of Technology, Indonesia

In this paper, we investigate a maintenance service contract for a warranted product carried out by the Original Equipment Manufacturer (OEM). The model was developed under the assumption that there are one consumer and one service provider who is the OEM. This is typically applied to the situation where the OEM is the only service provider such as in the mining industry. From the OEM point of view, two contract options were considered, they are: the OEM carried out all repairs and preventive maintenance activities; the OEM carries out failure and the customer undertakes in house preventive maintenance actions. The model uses a non-cooperative game formulation by maximizing expected profits. We use a linear function of failure intensity to consider a product with increasing failure intensity. We obtain the pricing structure in the contract. And for the customer, they can choose the optimal option under the term of contract.

Expert-Based FMEA of Wind Turbine System

Milton Kumar Das¹, Subhash Chandra Panja², Sunetra Chowdhury³, Shyamapada Chowdhury³, Andreas I Elombo⁴ ¹Indian Maritime University, India ²Jadavpur University, India ³University of Cape Town, South Africa ⁴University of Stellenbosch, South Africa This paper presents the results of a Failure mode and effects analysis (FMEA) conducted for wind turbine (WT) systems. The FMEA was performed on the functional modes of WT sub-systems in order to understand its performance of each sub-system, and to identify weaknesses in the respective sub-systems of WT considered. Sensitivity analysis had been done to investigate the cross-spreading of unreliability between sub-systems in the WT and a ranking of critical subassemblies was prepared on the basis of data supplied by experts that took part in the study. Overall, it was observed that crowbar protection and gearbox were found to be the two most critical

components of WT given a reference to the Risk Priority Number (RPN) value of 200. Also, some design and improvement of these components could be envisaged to help improve the performance of the entire WT system by means of reducing the number of failures.

Condition-based Maintenance for Systems Under **Dependent Competing Failures**

Liangpen Chen¹, Zhisheng Ye¹, Boray Huang¹

¹National University of Singapore, Singapore

Failures of complex systems may be various types. Natural failure due to degradation is one main mechanism. Other factors such as traumatic failure caused by random shocks from external environment are also critical to systems' operation. This paper proposes a new model to study complex systems that experience both degradation and shocks which are dependent. System reliability is analyzed and maintenance actions including periodic inspection, preventive maintenance and replacement are adopted to minimize the long-run maintenance cost rate. Sensitivity analysis is also included.

Session	Technology and Knowledge Management (3)
Date	Fri, 9 Dec
Time	08:30 - 10:30
Room	Jupiter II
Chairs	Ichiro Sakata, Chin Yuan Fan

A Model for Linking Knowledge Management Strategies, Critical Success Factors, Knowledge Management Practices and Organizational Performance; the case of Iranian Universities

Afarin Akhavan¹, Mohammad Saleh Owlia¹, Mostafa Jafari², Yahya Zare¹ ¹Yazd University, Iran

²Iran University of Science & Technology, Iran

This paper tries to present a conceptual model for studying the influence of knowledge management strategies on the performance of universities and institutions of higher education. Because of lack of knowledge management specific model in higher education, the proposed models for non educational environments have been used as guides to present a new model that considers knowledge management dimensions. Different strategies, critical success factors, knowledge management practices and performance indicators discussed in publications refer to higher education, were searched and these indicators connected with knowledge management were studied in different aspects. In this paper first recognize, analyze and classify the affective factors on the relationship between knowledge management strategies, organizational performance and knowledge management practices in universities and then a model to investigate the influence of different KM strategies on universities and institutes of higher education institutes.

Identifying Mapping Relationships between Functions and Technologies: an Approach based on Association Rule Mining

Linda Zhang¹, Roger Jiao² ¹IESEG School of Management, France

²Georgia Institute of Technology, United States

On one hand, design technologies provide solution principles to deliver product functions; on the other hand, they play a major role in achieving efficiency and effectiveness in product design and production. Recognizing this importance of technologies in product development and in response to the lack of investigation, this study proposes an approach based on association rule mining to identify mapping relationships between functions and technologies. Such mapping relationships not only help firms effectively decide on technologies and the corresponding details but also enable them to reuse proven knowledge about functions and technologies. A case study of microlithography machines is reported to demonstrate how the proposed approach identifies mapping relationships help select technologies and determine details.

Ranking of Technology Transfer Barriers in Developing Countries; Case Study of Iran's Biotechnology Industry

Khashayar Yazdani¹, Kourosh Yazdani Rashvanlouei², K. Ismail¹

¹University Technology Malaysia, Malaysia

²Sharif University of Technology, Iran

In this paper, first we shall define a list of technology transfer barriers in the biotechnology field through interviews and literature reviews. Next, we shall categorize them into four major categories of technology, and at last introduce all of the hypotheses on the existence of relationship between each part of technology and failure in the technology transfer process. Questionnaires consisting of two parts were created and handed out to all of the specialists and biotechnology idea-holders in the Iranian National Research center of Biotechnology, Lidco Co, Iran Pastor Institute, Biotechnology Department of University of Tehran, etc. Going on, we've evaluated the factors' validity through statistical tests and the recognized barriers' priorities in each category, which were generally, identified by Analytical Hierarchy Process (AHP) via the software Expert Choice. These priorities describe the high importance of organization-ware (34.1%), information-ware (27%), technique-ware (20.7%) and eventually human-ware (18.1%) respectively.

Managing Supply Chain Knowledge in the New Product Development Process: a Social Network Analysis Approach

Marianna Marra¹, William Ho¹, John S. Edwards¹

¹Aston University, United Kingdom

The aim of this paper is to propose a conceptual framework for studying the knowledge transfer problem within the supply chain. The social network analysis (SNA) is presented as a useful tool to study knowledge networks within supply chain, to visualize knowledge flows and to identify the accumulating knowledge nodes of the networks.

An Ontological Approach for Program Management Lessons Learned: Case Study at Motorola Penang Design Centre

Yu-N Cheah¹, Soo Beng Khoh², Ghee Beng Ooi² ¹Universiti Sains Malaysia, Malaysia

²Motorola Technology Sdn. Bhd, Malaysia

The Program Management Lessons Learned process helps organizations learn from past experiences and prevent similar mistakes in future projects. Current methods of capturing lessons learned through loosely defined questions and free flow templates often lead to unstructured documentations and information gathering. These drawbacks hamper efforts to retrieve and reuse meaningful and useful lessons learned information. This paper presents a newly developed ontological approach in the form of a template for capturing lessons learned in new electronic products design projects. The developed template embodies a source-impact-action (SIA) triple that categorizes knowledge in key learning and knowledge areas. A case study using the structured SIA-based template was successfully piloted at Motorola Penang Design Centre. Results of the SIA triple and its associated benefits shall be presented.

Optimization of a Knowledge-based System by a Meta-heuristic Approach for the Automotive Diagnosis Armin Azarian¹, Ali Siadat¹, Patrick Martin¹

¹Arts et Metiers ParisTech, France

Nowadays, one of the current challenges in the automotive industry is to establish a precise and accurate diagnosis in the after-sales workshops within a reasonable time in order to minimize the inconvenience for customers of the maintenance operations. The automotive industry had developed more and more electronic systems to enhance safety and comfort equipment, which lead to time consuming diagnosis sessions with traditional computer assisted diagnosis systems mostly relying on expert rules. Therefore, the diagnostic algorithm of such diagnosis systems needs to be improved. In this paper, the authors report their experience of the enhancement of a knowledge-based system to optimize the diagnosis on the basis of a meta-heuristic approach. The experimental platform used for the experimentations is the car diagnostic station SIDIS Enterprise developed by Siemens AG. Based on the integration of an appropriate strategy, the convergence to the faulty component is calculated with accuracy, as well as the lifetime, tests costs, suspicion rules and causal relations. The authors analyzed this methodology for different values of the weight parameters and report the results on a case-based consideration in the automotive domain.

Defining Technology Entrepreneurship

Markus Spiegel¹, Christian Marxt¹

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Over the last years Technology Entrepreneurship has developed as a distinct stream of research at the nexus of Entrepreneurship and the Management of Technology and Innovation. Yet, despite several special issues and an increased level of interest, no comprehensive definition of the field has been developed so far. This paper attempts to be a starting point for this discussion by deriving a framework based on elements identified in a review of the articles in the special issues. It structures Technology Entrepreneurship along the entrepreneurial process into a formation, exploitation and renewal phase and applies different levels of investigation at the product, firm and at the systems level.

Towards the Integration of Technological, Organizational and Human Subsystems of Organizations to Enhance Productivity

Mohammed Aminu Sanda¹, Jan Johansson¹

¹Lulea University of Technology, Sweden

This paper looks at the challenges that most organizations, especially in the mining industry, face in managing both technological and human activities along their value chains. The aim was to understand how the organization's technological, organizational and human components could be integrated to enhance collaboration and productive efficiency. Guided by an organizational activity theory framework, qualitative data were collected through interviews in a mining firm. The analysis of contradictions showed that production work in the mine is challenged due to the lack of proper coordination in task executions, with workers constrained in their task undertakings and unable to reduce downtime. It was concluded that firms can use the framework as an effective instrument, not only for organizational activity and work environment analyses, but as a tool for learning how to understand and manage the systemic characteristics of the technological, organizational and human components of their organizational activity systems.

Session	Technology and Knowledge Management (4)
Date	Fri, 9 Dec
Time	11:00 - 13:00
Room	Jupiter II
Chairs	Chui Young Yoon, Chien-Liang Kuo

Identification and Classification of Human Error in Process Model Development

Alexander Nielen¹, Denise Kolter¹, Susanne Mutze-Niewohner¹, Christopher M. Schlick¹

¹RWTH Aachen University, Germany

Process models capture important corporate know-how for an effective knowledge management (KM). However, many process models do not match with corporate reality and therefore cannot serve the intended purpose. Human Error is a major source for these inconsistencies that might hinder process implementation and maintenance as well as continuous improvement efforts. The approach presented in this paper accounts for a more active participation of employees in order to further increase the economical benefit of KM. To this purpose, a human error analysis in process modeling was conducted. The results derived from data of 64 subjects show that errors of omission and erroneous execution on an activity level are considerably higher for novices than for subjects with theoretical knowledge and experienced modelers. However, it can be concluded that even for experienced modelers complex modeling scenarios are prone to reasoning fallacies and thus represent a possible source for model inconsistencies in corporate practice.

Technological Capability Building in Network Environments: the Moderating Effects of Governance Structure

Suli Zheng¹, Zengyuan Wu¹ ¹China Jiliang University, China

To explain the origins of technological capabilities, we elaborate a theoretical framework by integrating the resource-based view and network view. We argue that network can provide firms network resources which greatly advance the formation of technological capabilities. Of these resources, two different mechanisms can be identified considering different governance structures. Hypothesis based on these ideas are tested on a sample of 208 manufacturing firms engaging in global production networks. Results from hierarchical regression greatly support the role of network resources and governance structure.

Open Innovation in Chinese High-tech Enterprises: An Empirical Research Based on Zhejiang Province

Fang Liu¹, Gang Zheng¹ ¹Zhejiang University, China

Based on data from 2010 Zhejiang Provincial Assessment Program for Research and Development Centers of High-tech Enterprises, this paper analyzes the state of open innovation in these enterprises from three dimensions, i.e., university-enterprise cooperation, the number of external R&D institutions, and outward technology transfer income. Then, this paper evaluates innovation performance of these high-tech enterprises based on authorized invention patents, standards and the rate of new product sales. In addition, we have a further analysis of problems in the process of conducting open innovation for them. This study finds that open innovation pattern in Zhejiang high-tech enterprises is still in its initial stage, and their awareness and capability of outward technology transfer is still weak. This study will enrich the knowledge of open innovation in the empirical context of Chinese high-tech enterprises and deepen our understandings of open innovation theory.

The Paradoxical Property of Knowledge in Organizations J. Ajith Kumar¹

¹T. A. PAI Management Institute, India

A dominant view in knowledge management (KM) over the last two decades has been that knowledge in the organization is a highly beneficial resource. Complex in nature, this resource is difficult to imitate and thus, gives an organization strategic advantage. In this paper I discuss that knowledge that helps an organization attain success can also drive its failure by inducing a sense of inertia in the face of environmental change and biasing decisions towards those taken in the past. This paradoxical property of knowledge, though hinted at in various literatures, has not been discussed in much detail. Using the story of Indian automaker Hindustan Motors Limited, and its well-known car model, the Ambassador, I attempt to highlight this property of knowledge. I argue that the paradox makes inquiry into management of knowledge problematic, and call for further research on the phenomenon.

Technology Manager's Radar Screen: Monitoring Competitors' Innovation Performance

Chung-Huei Kuan¹, Huei-Ru Dong¹, Mu-Hsuan Huang¹, Dar-Zen Chen¹ ¹National Taiwan University, Taiwan

To capture a competitor's innovation performance, both in terms of its productivity and impact, we propose to characterize its patent portfolio, including both cited and un-cited patents, by a pair of numbers. This pair of numbers, one related to the productivity and the other to the impact of the competitor, is obtained from the centroid of a so-called h-complement area of the citation distribution of the competitor's portfolio. As such, a large number of competitors' innovation performance embodied in their portfolios can be simultaneously captured and panoramically observed in a two-dimensional coordinate system. In addition to its simplicity and effectiveness, this approach provides us significant insight into where performance difference among these competitors lies, and allows us to track their performance evolution over time.

The Impact of Absorptive Capacity on the Ex-Post Adoption of Agile Methods: The Case of Extreme Programming Model

Bouchaib Bahli¹, Younes Benslimanne², Zijiang Yang² ¹ESC-Rennes School of Business, France

²York University, Canada

Agile development methods have emerged to overcome some of the process and product-related problems associated with traditional models. They are believed to be lightweight, people focused, adaptive and allow better information systems development (ISD) performance. Nevertheless, they require a significant capacity of absorbing new set of skills, knowledge and mindset changing. When using agile methods IS developers are faced with a challenge to quickly assimilate the mindset of these new methods and develop the ability to recognize information and apply it in context. This paper reports on two ex-post ISD project implementation. We integrate a central construct in the dynamic capability theory - absorptive capacity to explain agile method-Extreme Programming model. The implications of these findings for both researchers and practitioners are discussed.

Technology, Quality and Trade in the Apple Industry

Kayla Lopuch¹, Laura Syrett¹, John Conrad¹, Harm-Jan Steenhuis¹

¹Eastern Washington University, United States

This study explores the competitive nature of the global apple industry and its many intricacies. The apple industry is important to many countries around the world. Four of the major apple producing countries are the United States, China, Chile and New Zealand. In this study, these four countries are compared in the areas of technology, quality sustainability and the number of imported apples. Moreover, the purpose of the study is to explore the relationships between the level of storage technology and quality, and the relationship of apple importing and the quality of apples produced.

Session	Systems Modeling and Simulation (1)
Date	Fri, 9 Dec
Time	08:30 - 10:30
Room	Jupiter III
Chairs	Ville Ojanen, Maria Grazia Gnoni

A Robust-Gain-Scheduled Methodology for Process Parameter Design and Control with Application to a **Carbonated Beverage Filling Process**

Abdul-Wahid A. Saif¹, Muneeb A. Akram¹ ¹King Fahd University of Petroleum & Minerals, Saudi Arabia

Proper selection of control parameters is critically important since it has a large impact on the end product and enables keeping the operation run within the specified limits. It also helps to maximize profitability, to ensure quality and safety. In this paper, we will develop a Robust Gain-Scheduled (RGS) methodology that combines between the uses of: robust design to determine the optimal value of process parameters so that the controller maintains the process on target with low variability while keeping the performance robust against the external factors, and gain scheduling to modify the control parameters depending on the state of the system to maintain its stability. An example for carbonated beverage filling process is also presented.

Design and Modeling of Roll-to-Roll Manufacturing System Using Simulation Techniques

Laura Xiao Xia Xu¹, Chin Wei Gan¹, Feng Yu Wang¹, Ma Bin¹, Roland Lim¹ ¹Singapore Institute of Manufacturing Technology, Singapore

Roll-to-Roll (R2R) processing is a complex production system which involves discrete and continuous processes. Raw materials, in the form of rolls of functional film, go through their own unique routes of different process machines. This complexity makes it difficult to estimate and measure production performances and how well the performances will be a vital factor to determine the adoption of the new technology for a company. In this paper, these hybrid complex processes have been designed, modeled and simulated to obtain more accurate production performance data using simulation technique. Our simulation model is able to take parameters' inputs by the user (for example, machine speeds, order types, labor quantity, etc.), and give pertinent output data (for example, resource utilizations, order lead times, production throughputs, etc.) in a matter of minutes. This tool can also help to improve the R2R system performance by identifying optimal solutions through comparative analysis.

Design of Comminution Circuits for Improved Productivity Using a Multi-Objective Evolutionary Algorithm (MOEA)

Samson Mhlanga¹, Jabulani Ndlovu², Charles Mbohwa¹, Michael Mutingi³ ¹University of Johannesburg, South Africa

²National University of Science and Technology, Zimbabwe

³National University of Singapore, Singapore

The performance of a processing plant has a large impact on the profitability of a mining operation, yet plant design optimisation decisions are based on past experience and intuition rather than on scientific analysis. Genetic algorithms as a tool for circuit analysis in plant design and optimisation was considered. The multi-objective evolutionary algorithm initialises the plant design and optimisation based on experimental results, which are used to formulate and determine the objective function values. A simulation was conducted to assess the performance of candidate solutions. The two optima are then traded-off using cost objective, which is sought to be minimized. Once an optimum was selected, the circuit mass balance and equipment design was performed, bringing the theory of network design and genetic algorithms into unison. Results of the study provide financial benefits, optimal parameter settings for the comminution equipment and ultimately better plant performance.

Systems Thinking for Modeling Risk Propagation in Supply Networks

Abhijeet Ghadge¹, Samir Dani¹, Roy Kalawsky¹

¹Loughborough University, United Kingdom Large scale systems like supply chains are growing more global and complex. Quantifying supply chain risks is challenging due to their uncertain nature. Understanding of the risk propagation is expected to provide new directions for effective supply chain risk management. Using systems thinking approach for modeling risk propagation in supply chain, we have developed a conceptual understanding of risk propagation levels and dimensions. A case study of the Japanese tsunami (2011) has been analyzed and presented in a multi-dimensional perspective to validate the conceptual development of risk propagation. Key supply chain risks and their approximate risk propagation durations are identified for a typical natural disaster disrupting global supply chain network. Case study has validated the classification of risks based on their propagation zones in supply network.

A UML Approach for the Design of Reconfigurable Manufacturing Simulation Models

Hossam S. Ismail¹, Voon S. Tey¹, Lina Wang¹, Jenny Poolton¹ ¹The University of Liverpool, United Kingdom

This paper proposes an approach for the design of discrete event simulation models of large scale and complex manufacturing systems based on a UML representation of modular manufacturing entities and relationships. The approach simplifies the process of creating new manufacturing scenarios where by essential shop floor system parameters and logic can be modified frequently without in depth knowledge of simulation language. The use of object oriented design approach improves the clarity and the ease by which the manufacturing system is described and modified for the purpose of simulation. The paper provides an example of how this approach is used to verify the designs of a new assembly and packaging line.

Bayesian Calibration of Stochastic Computer Models Jun Yuan¹, S.H. Ng¹

¹National University of Singapore, Singapore

Computer models are widely used to simulate real processes. Within the computer model, there always exist some parameters which are unobservable in the real process but need to be specified in the computer model. The procedure to adjust these unknown parameters in order to fit the model to observed data and improve its predictive capability is known as calibration. In traditional calibration, once the optimal calibration parameter set is obtained, it is treated as known for future prediction. Calibration parameter uncertainty introduced from estimation is not accounted for. We will present a Bayesian calibration approach for stochastic computer models. We account for these additional uncertainties and derive the predictive distribution for the real process. Two numerical examples are used to illustrate the accuracy of the proposed method.

Wafer Lot Release Policies Based on the Continuous and Periodic Review of WIP Levels Khaled S. El-Kilany¹

¹Arab Academy for Science, Technology, and Maritime Transport, Egypt

This paper evaluates the impact of different lot release policies on the performance of semiconductor wafer fabrication facilities (wafer fabs). Lot release policies presented in this work are based on continuous review and periodic review inventory control policies. Proposed policies can be considered as modifications to the well known CONstant Work-In-Process (CONWIP) method. Simulation of the Intel Mini-Fab model is used to compare the performance of the fab using the CONWIP method to using these proposed policies. Additionally, two different dispatching rules are used at the bottleneck station to evaluate its impact on the fab performance when combined with the release policies. Performance is measured using an overall efficiency measure to represent the changes that occur in both cycle time and throughput rate. The work shows that periodic WIP review can improve the performance of the fab; while, continuous WIP review will have the same effect of the CONWIP method.

A Framework for Solving the Optimal Display Quantities with Equality Constraint

Takuya Suganuma¹, Hiroyuki Goto² ¹Nagaoka University of Technology, Japan ²Hosei University, Japan

This paper proposes a framework for determining optimal display quantities in shelf space for SPA (Specialty store retailer of Private label Apparel) retailers. In a field of inventory control in terms of optimization, a considerable number of previous researches focus on cases where there is a gap between the original demand and available shelf space. In this paper, we mainly consider a case where the gap is not great and examine the behavior of optimal solution for display quantities. In the formulation, we organize a multi-item newsvendor problem with an equality constraint for shelf space. By solving this problem, an analytical solution for optimal display quantities can be obtained, which would provide useful guidelines for practitioners.

Session	Systems Modeling and Simulation (2)
Date	Fri, 9 Dec
Time	11:00 - 13:00
Room	Jupiter III
Chairs	Arun Kumar, Carman Lee

Principles for Modelling Business Processes

Antonie van Rensburg¹ ¹University of Pretoria, South Africa

Any industrial engineer designing business processes can testify to the results of projects that went wrong because the initial process requirements were not correctly understood, formulated, or communicated throughout the design process. This paper identifies and defines fundamental systems thinking principles that should be present in a business process design methodology. The research is based on the understanding that complex business processes are formed from organized business patterns, and that the appropriate systems thinking principles enable the industrial engineer to capture these patterns and design business processes to reflect real world behaviour. Doing so enables the formulation of a well structured business process design specification.

Resolution of Resource Conflict in a Max-Plus Linear Representation - Case of a Single Project-

Shotaro Yoshida1, Hirotaka Takahashi2, Hiroyuki Goto3 ¹Nagaoka University of Technology, Japan ²Yamanashi Eiwa College, Japan

³Hosei University, Japan

This research proposes a method for resolving resource conflicts in scheduling problems of a class of discrete event systems. We focus on the framework of resolving resource conflicts in the Critical Chain Project Management (CCPM), which is expressed in the form of Max-Plus Linear (MPL) system. The proposed method can detect resource conflict by checking if time-lines and workers of the internal processes overlap. If a resource conflict is detected, the process with low priority is moved up. For moving up the schedule, we define a new adjacency matrix, by which the resource conflict can be resolved.

A Queuing System with Risk-Averse Customers: Sensitivity Analysis of Performance

Carlos Arturo Delgado¹, Ann van Ackere¹, Erik Larsen² ¹University of Lausanne, Switzerland

²University of Lugano, Switzerland

In this paper, we incorporate decision rules based on adaptive behaviour in order to analyze the impact of customers' decisions on queue formation. We deviate from most of the literature in that we model dynamic queuing systems with deterministic and endogenous arrivals. We apply a one-dimensional cellular automata in order to model the research problem. We describe a self organizing queuing system with local interaction and locally rational customers. They decide which facility to use considering both their expected sojourn time and their uncertainty regarding these expectations. These measures are updated each period applying adaptive expectations and using customers' experience and that of their local neighbours. This paper illustrates how the average sojourn time of customers in the system depends on their characteristics. These characteristics define how risk-averse customers are as well as how conservative they are regarding new information.

Balancing Multi-robot Prioritized Task Allocation: a Simulation Approach

M. Elango¹, S.P. Nachiappan¹ ¹Thiagarajar College of Engineering, India

Multi robot task allocation is a fundamental problem in robotics. Mostly multi robot task allocation (MRTA) problems concentrate on the minimization of the total distance travelled by the robots (Robot centered). Due attention is required for task centered allocation (task priority). A lot of real life application such as robotic search and rescue missions, environmental or hazardous clean-up missions emphasizes the priority of task allocation and balancing the utilization of robots. This paper develops a simulation model involving task priority and the utilization of robots and refers to it as a Balance multi-robot prioritized task allocation (BMRPTA) problem. The performance of the model is evaluated based on the minimum average waiting time and the completion time objective which ensures there would be a reasonable path balancing between the robots. Analysis has been carried out to study the effect of task priority on robot utilization.

Modeling Patient Visits to Accident and Emergency Department in Hong Kong M. Xu¹, T. C. Wong¹, K. S. Chin¹, S. Y. Wong¹, K. L. Tsui¹

¹City University of Hong Kong, China

Simulation emerges as an important technique in recent years for modeling complex operational dynamics in various healthcare institutions and hence providing deep insights for potential improvement. In particular, Accident and Emergency Department (A&ED) has been a place for such research as it accounts for a large proportion of the total hospital visits and admissions. To create a viable simulation for A&ED, accurate description and forecast of patient visits is the foremost step. This paper investigates several contributing factors to A&ED visits, and various time-series methods of modeling A&ED visits with different triage categories and mode of arrival. All the methods are compared in terms of goodness-of-fit and forecast accuracy. The purpose of this research is two-fold. First, this research is part of attempt to build a simulation model for A&ED of a local hospital. Second, the results may be useful for reexamine the resource allocation plan of the A&ED.

Evaluation of a Supply Chain Performance Using a Fuzzy Decision Support System

Isabel L. Nunes¹, Sara Figueira¹, Virgilio Cruz Machado¹ ¹Universidade Nova de Lisboa, Portugal

This paper presents the application of a Fuzzy Decision Support System (FDSS) model designed to assist managers in their decision process related with the choice of the best alternative to face Supply Chain (SC) disturbances. The FDSS operates supported on two main pillars, one is the use of Fuzzy Set Theory to model the uncertainty associated with disturbance occurrences, their effects on the SC and the computation of a Performance Index; the other is the use of ARENA (commercial simulation tool) to study the behavior of a SC subject to disturbances, and the effects of the implementation of mitigation or contingency plans designed to counter such disturbances. Using this FDSS, the decision maker can choose which the best solution is for his company considering not only his company's characteristics, but also the characteristics of the other SC entities.

Assessing Quality of Manufacturing Organizations - A Graph Theoretic Approach

Mohit Singh¹, I.A. Khan², Sandeep Grover³, S.C. Gupta¹ ¹Northern India Engineering College, India ²Jamia Millia Islamia, India

³YMCA University of Science & Technology, India

The aim of this paper to assess the manufacturing industries by determining a single numerical index with the help of Graph Theoretic Approach (GTA). To apply the Graph theoretic approach the authors identified the factors and co – factors through an intense literature survey and determined interdependence between them. The factors are grouped into four main factors namely Human Resource; Material, Machine and Methodology; Planning and Organization; Work culture. The GTA methodology reveals a numerical index showing the best industry.

On Storage Capacity Pooling through the Supply Hub in Industrial Park (SHIP): The Impact of Demand Uncertainty Xuan Qiu¹, George Q. Huang¹ ¹The University of Hong Kong, China

The Supply Hub in Industrial Park (SHIP) is proposed as a public warehouse providing warehousing and logistics services to internal enterprises of an industrial park. One of the most significant benefits of adopting the SHIP is the storage capacity pooling making efficient use of scarce land resources. This paper explores the SHIP's storage capacity pooling effect through examining the impact of demand uncertainty. Two mathematical models of the supply chain in a typical industrial park are formulated: with and without SHIP. The simulation approach is applied and sensitivity experiments are conducted for comparative analysis. The simulation results show that the storage capacity pooling is beneficial to the entire supply chain especially when the demand pattern is complementarily seasonal or identically volatile. Besides, the performance improvement of the supply chain becomes more significant when the demand variance is higher especially under the identically volatile demand pattern.

Session	Poster Session 3
Date	Fri, 9 Dec
Room	Venus III

Efficiency Improvement on Job Scheduling by Using Genetic Algorithm: A Case Study in Electronic Industry Budtree Limwanich1, Rati Wongsathan1

¹North-Chiang Mai University, Thailand

In this paper, we present the implementation of Genetic Algorithms (GA) which are modified to deal with the job scheduling in the electronic assembly industry. The performance comparison showed that the proposed GA gives perform significantly better in decreasing makespan and idle time. Furthermore, we accelerated the proposed GA by using the solution from the conventional heuristic methods as the initial population. It showed that the solution converges to the optimum faster than the former. However, due to the nature of stochastic search conducted by GA, we also focus on GA parameters which through experiment design and fine tuning of parameters.

Process Family Planning: a Methodology Integrating Petri Nets and Knowledge-based Systems

Linda Zhang¹, Qianli Xu² ¹IESEG School of Management, France

²Institute for Infocomm Research, A*STAR, Singapore

Planning production processes for product families (i.e., process family planning) has been recognized as a key to achieving production efficiency. In view of the advantages of Petri nets (PNs) for modeling large systems and the potential of knowledge-based systems (KBSs) for solving complex problems, we develop a methodology integrating PNs and KBSs to support process family planning. An integrated product-process family structure, called IP2S, is proposed to organize data pertaining to a product family and the corresponding process family. Accordingly, a PN model integrating the principles of several well-defined PN extensions is further developed to model the dynamics of process family planning (i.e., how production processes are planned for a product family). Based on the methodology, a prototype is developed, and applied to planning production processes for a truck family.

Shifting Economic Bottleneck Identification

Junqiang Wang¹, Jian Chen¹, Shuo Wang¹, Yingfeng Zhang¹, Shudong Sun¹ ¹Northwestern Polytechnical University, China

Shifting economic bottleneck identification aims to improve the overall throughput of manufacturing system. Firstly the two new concepts, throughput sensitivity of machine and

corresponding economic bottleneck, are mathematically defined. Secondly considering both throughput effect and active duration of machine, a new two-dimensional bottleneck indicator named active throughput and duration (ATD) is presented and new concave-convex Gantt chart is given for scheduling representation. Thirdly the shifting economic bottleneck identification (SEBI) method is presented to identify either the momentary economic bottleneck or statistically stable bottleneck. What's more, it also works well when facing the sole economic bottleneck, multiple economic bottlenecks and shifting economic bottleneck. Finally a practical job shop scheduling problem is optimized and the bottleneck identification is gained by the proposed method. Also a comparison between the proposed method and existing method is made. The results show that the proposed approach is effective and explicit for shifting economic bottleneck identification.

Coordination Policies in Product Development with Rework Bingyin Bao¹, Suxiu Xu¹, Qiang Lu¹

¹Harbin Institute of Technology, China

This paper investigates the performance of coupled development activities with rework by proposing a quantitative model based on a performance generation model (PGM). The objective of our model is to develop insights about optimal strategies (i.e., sequential, concurrent, or overlapped) to improve project performance, overlapping and coordination policies with rework and time-cost tradeoff involved in concurrent product development. Model analysis characterizes the solution space for the coupled development problem. Specifically, our analysis revealed the presence of four separate regions in the optimal coordination policies in product development: sequential strategy, concurrent strategy, early overlapping strategy, and late overlapping strategy. Also, we provide the explicit corresponding conditions for these four policies as demonstrated in theorems 1-4.

Research of Supplier Fuzzy Evaluation Based on Customer Satisfaction

Minghai Jiao¹, Xueying Hong¹, Ping Yan², Long Ren¹ ¹Northeastern University, China

²Shenyang Aerospace University, China

This paper researches customer demands as the initial input index for the establishment of the supplier evaluation system, and uses house of quality (HoQ) to quantify customer needs, then transforms them into a corresponding supplier evaluation index weight, finally uses the fuzzy comprehensive evaluation method to process the supplier evaluation indexes and obtain the components supplier satisfaction indexes. The case study shows that the methodology combining HoQ and fuzzy evaluation is effective for supplier capability evaluation and selection.

A Study on Audit Fees Decision Making: Evidence from China Stock Market

Xin Li¹, Xiaobo Zhu²

¹Chongqing University of Technology, China

²Bridgestone Europe NV/SA (Belgium), Belgium

This paper examines the correlating factors of the audit fees in China. By analyzing the data concerning a number of variables representing client size, auditing risks, auditor change and the prestige of auditing firm, a model is developed of the determinants of audit fees. The study confirms that most of the previous research findings are also applicable to the Chinese market, and that audit fees are significantly associated with the complexity of audited firm, the prestige of auditing firm, the board independence, the frequency of board meeting, and auditor change.

Data Pre-Processing by Genetic Algorithms for Bankruptcy Prediction

Chih-Fong Tsai¹, Jui-Sheng Chou² ¹National Central University, Taiwan

²National Taiwan University of Science and Technology, Taiwan

Bankruptcy prediction has been approached by data mining techniques. However, since data pre-processing including feature selection or dimensionality reduction and data reduction is a very important stage for successful data mining, very few consider performing both tasks to examine the impact of data pre-processing on prediction performance. This paper applies genetic algorithms, which have been widely used for the data pre-processing tasks, for feature selection and data reduction over a public bankruptcy prediction dataset. In particular, the experiments based on different priorities of performing feature selection and data reduction are conducted. The results show that performing data reduction only can allow the support vector machine (SVM) classifier to provide the highest rate of prediction accuracy. However, executing both feature selection and data reduction with different priorities performs the same. They not only largely reduce the dataset size, but also keep the similar performance as SVM without data pre-processing.

To Form a Smaller World in the Research Realm of **Hierarchical Decision Models** Bing Wang¹, Xiaotian Yao¹

¹Beijing University of Posts & Telecommunications, China

Hierarchical decision models (HDMs) have been used widely in industrial and academic fields. The world of research in HDM is shrinking due to the connectivity of collaborative relationships between researchers. For new research to become widely known and for collaboration to be done in HDMs, we want to identify and connect the clusters of the researchers and the central member of the clusters.

We use the social network analysis method to analyze the network of HDM researchers connected by coauthorship in the selected papers. We find out the important researchers with highest degree centralities and publication frequencies and the key researchers among the top 8 components. We act as the "information gatekeeper" by connecting the identified researchers so that the average distance between the vertices is eliminated significantly and thus construct a smaller world in the research realm about HDMs.

Threat Evaluation Model of Targets Based on Information Entropy and Fuzzy Optimization Theory Li-Ying FENG¹, Qing XUE¹, Min-xia LIU¹

Beijing Institute of Technology, China

To provide practical decision-makings for fire-target assignment of missile ground-to-air weapon system in anti-air warfare, a threat evaluation model based on information entropy and fuzzy optimization theory was studied. Firstly, information entropy theory was used to calculate the entropy weight of each evaluation index, and the importance weight of each index was also included, the entropy weight and the importance weight of each index were integrated to gain the final weight; Then, the fuzzy optimization theory was used to establish the threat evaluation model; Finally, the validity of the model was illustrated by a practical example.

Study of Deformation and Compensation for Ram-Quill Type Spindle

Chia-Hui Tang¹, Ching-Feng Chang¹, Tsair-Rong Chen¹

¹National Changhua University of Education, Taiwan

Ram-Quill combination spindle has been applied widely in Horizontal Boring Milling Machine. It is a great benefit that the machine can be used for various applications. But as the report of experiment, the ram housing bent when it is moved for more than half of its maximum travel. The straightness of Ram housing is out of the tolerance and the run-out of the spindle is way behind the requirement when spindle is at the maximum extension point. This paper proposes an electro-hydraulic monitoring and compensation system which will be able to adjust the pressure to the mechanism in time. The experiments prove that the straightness of horizontal surface can meet the requirement, and a ball bar test at the extremely weak point shows an improvement of the roundness tolerance for 15%. This can make the machine becoming superior equipment for high precision machining.

Fuzzy Classification of Gas Power Plant Spare Parts by Combination Statistical Classification Technique, SAW, ABC Analysis

Shahrokh Hematyar¹

¹MAPNA, Iran

Performing on time maintenance and inspections at power plant needs that the spare parts would be enough and accessible. In order to avoid over-stocking the spare parts in warehouses, it is important to use spare parts classification and then assign appropriate control method. The purpose of this paper is providing a technique to classify the spare parts by fuzzy approach. The Centeriod statistical classification, simple additive weighted (SAW) method and ABC analysis will be used in this paper to define membership function. This technique will be used to classify spare parts of power plant transformer. The results show that inventory managers and decision makers are satisfied by using this method. Using linguistic variables makes this method more understandable and considering weight for each criterion makes the results more acceptable. The membership function can be used to classify the new items directly without rebuilding the membership function again.

The Impact of Work Design Concept on Manufacturing Performance: A Process Sector Case Study

Nimesha Vilasini¹, Udaya Kahangamage¹, Janaka Gamage¹, Wathavana Vithanage Randika Kosala¹

¹University of Moratuwa, Sri Lanka

New strategic initiatives have gained importance in recent past due to its ability to improve process performance and reduce cycle time. Therefore, manufacturing companies are constantly exploring ways to adopt such strategic initiatives. However, ineffective use of scientific management approaches often leads to conflicts between management and workers. This has been a critical obstacle of enhancing productivity of well established large companies where there is a presence of strong labour unions. The purpose of this study is to elaborate on how work design concept act as a scientific foundation for such situations in implementing strategic initiatives. This study has been carried out in collaboration with a leading soft drink manufacturing company in Sri Lanka. To apply the work design concept, a generic model of work design is defined and applied to the selected work centres of the company. The results show a significant improvement in the productivity of the work centres.

Designing an Integrated Order Fulfillment System for Configure-to-Order Production Linda Zhang¹, Qianli Xu²

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In accordance with diverse customized products, an increased attention has been paid to the order fulfilment process in configure-to-order production. However, most of the solutions reported either focus on isolated areas without considering the impacts from/on the related issues or approach order fulfilment processes from a strategic level. In view of the limitations of existing solutions and the significance of order fulfilment activity automation and integration, this study proposes an integrated order fulfillment system (IOFS) by considering the entire spectrum of order fulfilment process at an operational level. The IOFS is designed to automatically execute order processing, configure products and process plans based on product and process family models. It assists companies to quickly respond to diverse customer requirements and deliver the expected products at low costs. An industrial example of turn unit assemblies is presented to demonstrate the feasibility and potential of the IOFS.

Planning Process Families with a Knowledge-based System

Linda Zhang¹, Qianli Xu², Yongyi Shou³ ¹IESEG School of Management, France ²Institute for Infocomm Research, A*STAR, Singapore

³Zhejiang University, China

Given the finite manufacturing resources available on a shop floor, process family planning has been well recognized as an effective means of achieving product family production efficiency. In view of the fundamental issues in process family planning and the potential of knowledge-based systems (KBSs) in solving complex problems, in this paper, we put forward a prototypical KBS to support process family planning by automatically generating production processes. The XML-based knowledge representation is adopted to alleviate the difficulties in modeling complex product and process family data and planning knowledge. To cope with constraint handling, a mechanism is designed to facilitate the generation of production rules, which model various planning constraints. Planning production processes for a truck family is used to demonstrate the potential of the prototypical KBS.

Performance Evaluation of Knowledgeable Manufacturing Systems Using Petri Nets Considering Dynamic Events

Youlong Lv¹, Jie Zhang¹ ¹Shanghai Jiao Tong University, China

As the market changes more and more severely, the variation of manufacturing environment becomes more dynamic and has greater influence on the performance of KMS. So studying the dynamism and obtaining the knowledge of the dynamism are important for KMS. This paper analyzes the dynamic events in KMS and their influence on performance of KMS. Stochastic Petri nets are introduced as a way to build the model of KMS. Three typical kinds of dynamic events (equipment failure, work piece rework and rush orders) are extracted based on the characteristics of KMS and are expressed in the Petri nets. Then Petri nets for a specific KMS is built and a performance evaluation method of such Petri nets is proposed. Experiments are also conducted to validate this evaluation method.

Using Bayesian Networks and Importance Measures to Indentify Tumour Markers for Breast Cancer

Shubin Si¹, Guanmin Liu¹, Zhiqiang Cai¹, Peng Xia² ¹Northwestern Polytechnical University, China ²Xi'an Jiaotong University, China

Because breast cancer has become one the most common cancer among women, this paper identified some effective tumour markers from historical patient records to support cancer diagnosis. First, the advantages of Bayesian network (BN) in target classification are discussed, and the concept of importance measures are introduced. Then, the original breast cancer data records used for case study are collected from the first affiliated hospital of medical college of Xi'an Jiaotong University, China, which are also discretized and cleared to form the standard modelling dataset. Finally, the practical BN model of each target variable is learned from the dataset respectively according to the tumour marker variables of breast cancer. Based on the constructed BN models, the importance values of all tumour marker states are calculated and discussed for tumour marker identification.

Identifying Critical Business Rules Using Rough Set Theory Mohamad Aghdasi1, Ehsan Malihi1, Fatemeh Ghorbani

¹Tarbiat Modares University, Iran

This paper proposes a framework to find Critical business rules using rough set theory. Identification of Critical Business objects caused to identify critical business rules. Critical business rule as a new concept in business process domain, are those of business rules which have more affect on desired business results. Finding critical business rules help analysts to take actions to modify and optimize these rules aligned to business goals. Proposed methodology applied in real case for selling process.

Apply HLM to Analyze Government Policies Influence the Accessibility Of Sidewalks

Ching-Tsung Hung¹

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In the long term intent of the Americans with Disabilities Act (ADA) that publicly available services along a public street be accessible to people with disabilities via a continuous, unobstructed pedestrian circulation network. Many countries follow the concept of ADA and implement relevant laws. This study supposes that government policies will affect the barrier-free sidewalks environment. The government policies are organization level, and the accessibility of sidewalks is Individual level. Hierarchical linear modeling (HLM) can handle the relationship with different levels. With the result, the related law did not influence the situ performance of sidewalks. Only managing sidewalks plan and budget has mediational effects. It means that the related law is long-term effect and the sidewalk accessibility assessment process will be modified.

Confidence Interval Estimation of Software Reliability Growth Models Derived from Stochastic Differential Equations

Chih-Chiang Fang¹, Chun-Wu Yeh²

¹Shu-Te University, Taiwan ²Kun Shan University, Taiwan

The study develops a software reliability growth model (SRGM) with confidence intervals that provides software developers useful information to decide the optimal software release time and to refine the quality of software testing tasks. The developed SRGM of this study is based on stochastic calculus to deduce the confidence intervals of the mean value function at different confidence level. Owing to less clear explanation of the variance in the mean value function of cumulative software errors in most software reliability growth models, it might not be effective in deducing the confidence interval concerning the mean value function. Therefore, software developers cannot estimate the possible risk variation in software reliability, and it might diminish the value of practical applications. In this study, we utilize the method of stochastic differential equations and five classic models (Goel and Okumoto's model (1979), Yamada's Delayed S-shaped model (1983), Ohba's Inflection S-shaped model (1984), Yamada's exponential model (1992), Chiu and Haung's learning effect model (2008)) to build the SRGM with confidence intervals that can assist the software developers in determining the optimal release times at different confidence levels. With regard to the software failure phenomena, they were supposed as Non-homogeneous Poisson Process (NHPP) in this study.

A Genetic Algorithm Approach for Modelling and Optimisation of MAJSP- Part I:Modeling Roohollah Milimonfared¹, Romeo Marian¹, Zeinab Hajiabolhasani¹

¹University of South Australia, Australia

This paper and its companion (Part 2) will focus on Multi-Attributes Job-Shop Scheduling Problem (MAJSP). MAJSP is an extension of classical JSP. It represents more realistic scheduling problems since it includes more constraints of jobs. The objectives for part 1 are first to investigate whether the provided resources are appropriate for one month schedule and second to maximise the profit for a MAJSP by different methods of resource allocations. In the second part, the effect of genetic operators on the optimal solution obtained by the previous part will be discussed. In a MAJSP, more attributes introduce more types of resources. The resources are in terms of labour, material, and capital which can be restricted to be equally or non-equally allocated to the machines. Here, two algorithms were developed based on these assumptions and it was found the latter approach yields better results in terms of optimality and convergence speed.

On The Development of Adoption of Newer Successive **Technologies Using Stochastic Differential Equation** P.C. Jha¹, Kuldeep Chaudhary¹, Anshu Gutpa¹

¹University of Delhi, India

In the literature some models have been proposed to describe the diffusion behavior of the successive generational products based on deterministic new product diffusion models for single generational products. The deterministic models ignore the environmental as well as internal system disturbances. These disturbances create randomness in the adoption process which is likely to be larger in case of generational products. A few single generation diffusion models describe this randomness by introducing stochasticity using Ito's type stochastic differential equations. In this paper, we formulate a mathematical model, that simultaneously describe the adoption pattern of a base technology and substitution effect over the generations of the base product for durable technology product, using stochastic differential equations with continuous state space. The validity of the proposed model is illustrated using four generation IBM Main frame computer data reported in literature.

A Framework Algorithm for a Real-World Variant of the Vehicle Routing Problem

Vu Pham¹, Tien Dinh¹ ¹University of Science, Viet Nam

The vehicle routing problem has a half-a-century development history with many variants and algorithms. In this work, we tackle a real-world variant which has a heterogeneous fleet of vehicles and requires scheduling at limited-slotted depots with a time window constraint at a centralized garage. We first give problem formulations, introduce our approach to decompose this variant into subproblems and present our framework algorithm with experiments on real-world data sets. Experimental results show that our algorithm outperforms the heuristic method relaxed from dynamic programming and the multi-stage local search method. Our result is also far better than that of the experience-based greedy method. Significant savings with low resource consumption suggest practical use of our algorithm in real-world applications.

A Branch and Cut Algorithm for the Multi-Vehicle

One-to-One Pickup and Delivery Problem with Split Loads Temel Oncan¹, Dilek Tuzun Aksu², Guvenc Sahin³, Mustafa Sahin³

¹Galatasaray University, Turkey

²Yeditepe University, Turkey 3Sabanci University, Turkey

In this work we deal with the Multi-vehicle One-to-one Pickup and Delivery Problem with Split Loads (MPDPSL). This problem is a generalization of the one-to-one Pickup and Delivery Problem (PDP) where each load can be served by multiple stops by the same vehicle. In practice split deliveries is a viable option in many settings such as courier services of third party logistics operators. We propose a branch-and-cut algorithm which employs valid inequalities devised for special cases of the MPDPSL, such as the Dial-a-Ride Problem, PDP and Split Delivery Vehicle Routing Problem. According to our computational experiments with randomly generated test instances, we may claim that the proposed algorithm can be used for small sized instances.

Research on Rapid Design Plan For Engine Based on Human Factors Engineering

Han Yu¹, Qing Xue¹, Minxia Liu¹

¹Beijing Institute of Technology, China

Based on the theory of Human Factor Engineering, Modular design and Interface technology, the paper put forward rapid design plan and prototype system for engine under the guidance of those theories. The innovation of this system was fulfilling transmitting parameters of engine by using interface technology, and achieving the application of module structure by using interface template. The page design of the system was guided by color collocation theory, readability and operability. System evaluation fully embodied the humanization design, and emphasized user's experience.

Towards Human Stability in Transport Systems

Philippe Richard¹, Vincent Benard¹, Frederic Vanderhaegen², Patrice Caulier² ¹IFSŤŤAR, France

²LAMIH, CNRS, France

Human errors are responsible for about 70% of incidents and accidents in transportation systems. This paper proposes to take into account human stability whose main objective is to improve system risk assessment. Some definitions about concepts of robustness, resilience ... are provided to position the human stability in relation to these definitions. Then, a definition of human stability is proposed and a formalism based on a set of states and transitions is presented. A first mono-criterion assessment method is proposed and applied to a transportation system: the air traffic control.

Work Motivation and Job Performance of Frontline **Employees: the Mediating Role of Organizational** Commitment

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This paper outlines the critical role of employees' organizational commitment in the link between work motivation and job performance. The discussion arises primarily based on the considerable theoretical vagueness and empirical inconclusiveness concerning this relationship that appears in the literature. As of interest to address this gap, a research framework is developed in which organizational commitment acts as the mediator between work motivation and job performance. The empirical findings from a survey of 220 bank frontline employees in Greece confirmed the mediating role of organizational commitment. The main implication of the findings for managers is that motivated frontline bank employees are more likely to achieve better job performance when they are committed, as a result of enforced HRM practices.

The Human Factors Analysis of Marine Accidents Based on **Goal Structure Notion**

Tingting Dai¹, Haiyan Wang¹

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The human actor is a main factor which results in marine accidents which has been recognized by the navigation system. And it has been a key problem how to control and reduce the marine accidents. In this paper, Goal Structure Notion (GSN) is adopted to analyze the marine accident and research the existent of various potential risk factors which are demonstrated from five factors of organization and management, environment, human, ship equipment and the regulations. The paper mainly studies the subsystems of the human factors framework, which consist of the physical and mental qualities protection factor, behavioral protection factor, education and training protection factor, human group behavior protection factor and work attitude protection factor. And some recommendations are putting forward to reduce the human factors.

Situational Awareness Needs for System Interaction Design

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This paper presents an analysis on Situational Awareness needs that will help to improve the interaction design between user(s) and system(s). Interaction design very much interested on how to design a product or a system used in working environment concerning how user interact and communicate with each other. Due to the limited study on Situational Awareness (SAW) that highlights on human interaction criteria, this study is aiming to provide some input on the cues related to perception, comprehension and projection from operators' needs. We employ surveyed technique as to gather operators' requirements and most of the targeted operators involved in this study are from the manufacturing industries. Findings on SAW needs are fully addressed to further explore SAW in interaction design study.

A Design of 3D Modeling Virtual Fitting Project for Online Shopping Pangli Zuo¹, Yi Zhao²

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²Beijing University of Posts and Telecommunications, China

In the modern society, it is no doubt that shopping online is much more efficient compared with shopping in a particular mall. Customers are offered wider choice and save time, absolute advantages compared with traditional method, by shopping online. However, like advantages, weaknesses of online shopping do exist. For instance, customers cannot view products from different angles, or try on clothes virtually; they may worry about the fitness of the clothes. To reduce uncertainty, we design an engineering project, 3D modeling virtual fitting. Customers only need to upload their three-dimensional figure model and choose the clothes they like; they will see the model wearing the clothes they choose for the systems will synthesis the figure model with cloth models automatically. Taking this project can attract potential customers and reduce the logistics costs for return the unfit clothes. However, the technique of three-dimensional reconstruction is still in the test phase.

Achieving Platform Leadership: Application of Inverting and Porting in System Development

Jerome Chih-Lung Chou¹, Chia-Liang Hung², W. T. Li² ¹Hwa-Hsia Institute of Technology, Taiwan

²Chi-Nan International University, Taiwan

Inverting and porting are two of modular operators identified by Baldwin and Clark (2000) in Design Rules to characterize changes of system modularity. The objective of this article is to examine the economics of inverting and porting and to infer their implications to platform strategy. The result is that for inverting to be beneficial, the module must have technological nature of a platform, which is to interact with many modules, and to succeed in inverting, transactional mechanisms and marketing initiatives must be devised because suppliers and consumers are linked by modular compatibility resulted from standardized interfaces. Porting can be applied passively to deliver benefit of insurance or actively to advocate new value propositions. Active porting starts a window of opportunity for the module to invert to become a platform. The case of the leading digital music service provider in Taiwan, KKBox, is discussed as an illustration.

Uncertainty Analysis on Number of Fatalities in Building Fires

Guanquan Chu¹, Jinhui Wang²

¹Waterborne Transportation Institute, Ministry of Transport, China ²Shanghai Maritime University, China

A probabilistic ASET (Available Safe Egress Time)/RSET (Required Safe Egress Time) timeline assessment approach is presented to make uncertainty analysis on number of fatalities in building fires. ASET and RSET are achieved as two dependent random variables with consideration of uncertainties of fire dynamics and human behaviors. When analyzing stochastic ASET, uncertainty of design fires is considered by coupling Monte Carlo simulation with two-zone fire model. When analyzing stochastic RSET, uncertainty of fire detection and alarm time is considered by coupling fire model and Monte Carlo simulation. Occupant pre-movement time is proposed as probability distribution. The interdependency between ASET and RSET is considered in the analysis process by lognormal fire growth rates. To demonstrate the approach, a case study is discussed.

Composable Correlation Mining of Cloud Service in Cloud Manufacturing

Hua Guo¹, Lin Zhang¹, Fei Tao¹, Zhiyun Ren¹, Yongliang Luo¹ ¹Beihang University, China

The emergence of cloud manufacturing (CMfg) provides a new opportunity for the change of manufacturing towards service-oriented model. Cloud service composition (CSC), which can realize the added value of cloud service (CS), is the core to implement CMfg. Since there always exist correlations among CSs, especially composable correlation (CoC), which can affect the construction of CSC path. Hence, how to mine the CoC among CSs and judge which kind of CoC between them is a key issue. This paper presents the formalized description for CoC, and designs decision algorithms to judge CoCs between CSs based on bipartite graph. The case study illustrates the application of proposed algorithms.

Energy Adaptive Immune Genetic Algorithm for Collaborative Design Task Scheduling in Cloud **Manufacturing System** Yuanjun Laili¹, Lin Zhang¹, Fei Tao¹

¹Beihang University, China

A new manufacturing paradigm, i.e. Cloud Manufacturing (CMfg) has been proposed recently. In order to satisfy high efficiency and low cost collaborative design task scheduling in CMfg, a new energy adaptive immune genetic algorithm (EAIGA) was designed. With the introduction of potential energy storage and detection, the new algorithm can not only improve searching diversity based on immune strategy, but also adaptively adjust the probabilities of crossover and mutation with low time complexity. The experimental results demonstrate that the new algorithm can effectively solving collaborative design task scheduling problem with a good balance between searching diversification and intensification.

Design of a Lean Development Framework

U. Dombrowski1, Thimo Zahn1

¹Technische Universitat Braunschweig, Germany In today's business environment many enterprises react to changing conditions by implementing lean development (LD). LD offers an approach to eliminate waste, achieve high quality, and reduce the time-to-market. Enterprises that want to implement LD are faced with many different concepts. The paper presents the major LD-concepts published during the last 10 years and summarizes the contents in a framework, which contains seven prin-ciples. The framework can be used as basis to develop enterprise-specific LD-concept with the consideration of all important aspects of LD. The developed framework was validated in the automotive industry and further research needs are mentioned.

Study on the Variation and Survival Factors in the Business **Evolution Process Based on Organizational Ecology**

Jie Hou¹, Qiang Lu¹, Yongjiang Shi²

¹Harbin Institute of Technology, China ²University of Cambridge, United Kingdom

Based on the theory of Organizational Ecology, this paper studies five Enterprises in the format of business ecosystems in the industries of electric car and consumer electronics. The findings show that, in a business evolution process, the major influencing factors for variation are market expansion, resource advantage expansion and application of new business model, and the survival strategies after the variation include legalization and resources accumulation, which aims to raise the organization inertia. Business growth is a continuous "trial and error" and innovation process of finding the right niche.

A New Practical Conformance Testing Method Based on Standard

Zhou Jiang¹, Li Zheng², Fujiang Liu³, Qing Xiang² ¹Tsinghua University, China National Institute of Standardization, China ²Tsinghua University, China

³Zongdycyber Group Co. Ltd, China

The overall framework and principles of conformance and testing have been described by the series standards of ISO/IEC 9646. However, those standards fail to present a feasible tool to execute the testing. In this paper, a new practical conformance testing method based on standard is presented. First, the system under test(SUT) answers to the Implementation Conformance Statement(ICS) proforma designed by the testing laboratory based on the basis standard, then the corresponding use cases for testing could be settled based on the answers and the testing proforma could be designed accordingly, establishing a practical mechanism to instantiate the Executable Test Suite(ETS) with the Abstract Test Suite(ATS). Additionally, a number of experiments were performed to certify the validity of our method. The results indicate that the method can be popularized in the field of standardization

A

AARABI, Majid p.39 ABBASI, Sahar p.53 ABDUL RAHMAN, Azizah p.84 ABDULLAH, Rohana p.74 ABEDZADEH, Mostafa p.35 ABELE, Katrin p.46 ABOU MSABAH, Slimane p.45 ACKERE, Ann van p.80 AGARWAL, Gopal p.37 AGGARWAL, Anu.G p.75 AGHDASI, Mohamad p.83 AGUSTINA, Dwi p.34 AHMAD, Nafis p.44 AHMADIZAR, Fardin p.66 AHMED, Pervaiz Khalid p.71 AHSAN, Kazi Badrul p.66 AKHAVAN, Afarin p.77 AKIYAMA, Masanori p.59 AKRAM, Muneeb A. p.79 AKSU, Dilek Tuzun p.83 AKULA, Shakti p.75 ALENCAR, Luciana p.56 ALIAS, Rose Alinda p.84 ALMEIDA, Adiel p.33, 56 AL-ME'RAJ, Ismail p.70 ALOISE, Dario p.33 AMANO, Yoko p.45 AMIN, Aamir p.42 AMINI, Alireza p.68, 39 AMIRI, Amirhossein p.73, 74 AMIRI-AREF, Mehdi p.63, 52 AMORNSAWADWATANA, Sataporn p.37 AMRINA, Elita p.62 ANAND, A. p.61 ANAND, Adarsh p.35 ANUAR, Nurul Izah p.48, 49 ANZANELLO, Michel p.40 AOYAMA, Atsushi p.33 AREZES, Pedro p.59 ARISAMADHI, T.M.A. p.39 ARTIGUES, Christian p.34 ARYANEZHAD, M.Bahador p.63 ASIM, Muhammad p.46 ATASHI, Arsham p.35 AURELIO, Diogo p.53 AURIOL, Guillaume p.69 AYUTIRTA, P. Laras p.71 AZABADI, Jamal Hosseini p.69 AZADNIA, Amir Hossein p.31 AZARIAN, Armin p.77 AZHDARI, Armaghan p.74

B

BABA-ALI, Ahmed Riadh p.45 BABAR, Osman p.46 BABOLI, Armand p.39 BABOVIC, Elmir p.45 BADURDEEN, Fazleena p.72 BAGIA, Ravindra p.48 BAHLI, Bouchaib p.78 BAO, Bingyin p.81 BAPTISTA, Elesandro A. p.48, 47 BARMAN, Goutam p.74 BARON, Claude p.69 BARROSO, Ana Paula p.58, 39 BASHIRI, Mahdi p.73, 63, 74 BASRI, Shuib Bin p.42, 48 BASSETTO, Samuel p.73 BASTIAS, Alfonso p.65 BAUER, Wolfgang p.47 BAUMANN, Philipp p.41 BAUMGARTEN, Sven p.33 BAZRAFSHAN, Majid p.75 BECKER, Peter p.40 BEHESHTI, Hooshang M. p.39 BEHNAMIAN, J. p.53

BEHROUZI, Farshad p.37 BEHROUZI, Farzad p.37 BEKESAS, Luiz C. p.48, 47 BELSKI, Alexander p.45 BEN JAAFAR, Ines p.66 BENARD, Vincent p.84 BENSLIMANE, Younes p.62 BENSLIMANNE, Younes p.78 BERA, Sasadhar p.74 BERGES, Luis p.76 BERGMAN, Bo p.73 BERRYMAN, Matthew p.45 BHUIYAN, Yeasin p.42 BI, X. p.59 BIN, Ma p.79 BIN IDRUS, Arazi p.55 BLASZCZYK, Tomasz p.56 BOKHORST, Jos A.C. p.72 BRANDINU, Gianluca p.56 BROWN, Adam p.72 BURGGRAF, Peter p.64 BUSCHMANN, Markus p.64

С

C.R., Jithin p.65 CAGNO, Enrico p.64, 59 CAI, Zhiqiang p.82 CAKRAVASTIA, Andi p.39 CAMPOS, Ana Carolina p.33 CAPRIHAN, Rahul p.40, 72 CARIDI, Maria p.68 CATTRYSSE, Erik p.42 CAULIER, Patrice p.84 CEDER, Avishai p.51 CHAI, Kah-Hin p.65 CHAKRABORTŶ, Ayon p.54 CHAN, Felix T. S. p.48 CHAN, Mong-Tien p.31 CHANG, Chin-Chih p.52, 72 CHANG, Ching-Feng p.82 CHAO, Tzu-Chin p.52 CHATAVITHEE, Pachara p.40 CHAUDHARY, Kuldeep p.41, 83 CHEAH, Yu-N p.77 CHEGENI, Majid p.70 CHEN, Aiqing p.75 CHEN, Bing p.47 CHEN, C. M. p.45 CHEN, Chun-Hsien p.40 CHEN, Dar-Zen p.78, 60 CHEN, Hua Xing p.36 CHEN, Hui-Chen p.51 CHEN, Jian p.81 CHEN, Jiang Hang p.68 CHEN, Jin p.65 CHEN, Li Wei p.65 CHEN, Liangpen p.76 CHEN, S. H. p.67 CHEN, Shin-Guang p.43 CHEN, Songlin p.6 CHEN, Ssu-Han p.60 CHEN, Tsair-Rong p.82 CHEN, Tung-Tsan p.69 CHEN, Wenjun p.56 CHEN, Xingyu p.40 CHEN, Yin-Ju p.65 CHEN, Yuepeng p.46 CHEN, Yung-Hsin p.57 CHENG, Chun-Yuan p.67 CHIANG, Shu-Min p.49 CHIDAMBARAM, Ramanathan p.55 CHIN, K. S. p.80 CHIOU, Cherng-Ying p.67 CHOI, Hae-Jin p.52 CHOI, K.S. p.59

CHONG, Alain Y. L. p.48 CHONGSTITVATANA, Prabhas p.45 CHOU, Jerome Chih-Lung p.84, 56 CHOU, Jui-Sheng p.48, 81 CHOWDHURY, Shyamapada p.76 CHOWDHURY, Sunetra p.76 CHU, Chihpeng p.50 CHU, Guanquan p.84 CHU, Sydney C. K. p.35 CHUANG, Hsiao-min p.50 CHUNG, Chia-Shin p.37 CHUNG, J.H. p.59 CHUNG, Yu-Chun p.71 CHUTIMA, Parames p.45 CINAR, Yahya p.70 CIRAVEGNA, Luciano p.69 CLARYS, Jan Pieter p.42 CONRAD, John p.78 COPPINI, Nivaldo L. p.48, 47 CORRER, Ivan p.47 CORTES, Patricio p.65 CREEMERS, Stefan p.55 CRUZ MACHADO, Virgilio p.66, 58, 39, 53, 80 CUI, Hui p.59

D

DAI, Tingting p.84 DAI, Wei p.74 DAMAYANTI, Dida p.53 DANI, Samir p.79 DANIILIDIS, Harrys p.47 DAS, Milton Kumar p.76 DE LA SEN, Manuel p.52 DE SMET, Yves p.52 DEEFI ANNA, Îka p.38 DEHGHANIAN, Farzad p.39 DELGADO, Carlos Arturo p.80 DEMEULEMEESTER, Erik p.55 DESAI, Tushar N. p.75 DHANASEKAR, B. p.72 DIGALWAR, Abhijeet p.43 DINH, Tien p.83 DJAUHARI, Maman p.43, 54, 74, 41DOMBROWSKI, U. p.85 DOMINIC, P. D. D. p.48 DONG, Huei-Ru p.78 DUC, Truong Ton Hien p.52 DUFFUAA, Salih p.70 DUMKE, Michael p.45 DUPONT, Lionel p.66

Е

EAGER, David p.48 EDMAN, Lennie p.59 EDWARDS, John S. p.77 ELALOUF, Amir p.51 ELANGO, M. p.80 ELEZI, Fatos p.51, 68 EL-KILANY, Khaled S. p.79 ELOMBO, Andreas I p.76 ERGENC, Ali Fuat p.66 ESPADINHA-CRUZ, Pedro p.66 ESSAM, Daryl p.34 EUSGELD, Irene p.76 EZE, Uchenna Cyril p.55, 38

F

FAN, Chin Yuan p.61 FAN, Yilin p.61 FAN, Zhigang p.49 FANG, Chih-Chiang p.83 FATEMI GHOMI, Seyyed Mohammad Taghi p.53, 57, 58 FENG, Li-Ying p.82 FERA, Marcello p.68 FERRIS, Timothy p.45 FIEGENWALD, Valerie p.73 FIGUEIRA, Sara p.80 FILIPPOV, Sergey p.55 FLYNN, James p.37 FOGLIATTO, Flavio p.40 FORE, Stanley p.70 FOTUHI, Fateme p.32 FRANKE, Stefan p.45 FU, X.D. p.35 FUJII, Nobuzumi p.73 FUJIMURA, Shigeru p.40 FUJIMURA, Shuzo p.62 FUNG, Richard Y. K. p.72 FURST, Elmar p.73 FURUKAWA, Takao p.44

G

G. MANALO, Romeo p.69 GALAR, Diego p.76 GAMAGE, Janaka p.82, 53 GAN, Chin Wei p.79 GAO, Tiegang p.47 GEIGER, Florian p.41 GENG, Shuai p.49 GERBER, Aurona p.60 GHADGE, Abhijeet p.79 GHAHREMANLOO, Hoda p.46 GHEDIRA, Khaled p.66 GHORBANI, Fatemeh p.83 GNONI, Maria Grazia p.66 GOH, Chong Minsk p.71 GOH, Gerald Guan Gan p.55, 38 GOH, Mark p.37 GONEN, Amnon p.59 GOODYER, Jane p.43 GOTO, Hiroyuki p.79, 80 GRACE, J. R. p.59 GRIESBACH, Tim p.45 GRIGG, Nigel p.43 GRILO, Antonio p.66, 53 GROVER, Sandeep p.80 GRUBER, Sebastian p.64 GRUND, Martin p.60 GU, Qiaolun p.47 GUO, Hua p.84 GUO, Peijun p.32 GUO, Ying p.68 GUPTA, S.C. p.80 GURGEL, Andre p.33 GUTPA, Anshu p.83

н

HABIB, Md. Mamun p.38 HADAS, Yuval p.51 HAJIABOLHASANI, Zeinab p.83, 68 HAJIHA, Ali p.45 HAKIMI-ASIABAR, M. p.53 HALIM, Abdul Hakim p.76 HAMAGUCHI, Tomoki p.34 HAMDANI, K. p.59 HAMMAMI, Ramzi p.46 HAMTA, Nima p.53 HANAFI, Jessica p.43

HANDANI, Dhimas p.75 HANG, C. C. p.49 HARIDY, Salah p.73 HARIYANTO, Surya p.75 HASANI, Reza p.58 HASHEMI, Maliheh p.52 HASHIMOTO, Ken p.62 HASSAN, Mohd Fadzil p.42 HATAMI, Tahmas p.47 HATANI, Jiahnus p.47 HAZRA, Jishnu p.71 HEIDARI, Hamed p.49 HELLENBRAND, David p.47 HEMATYAR, Shahrokh p.82 HEMDI, Abdul Rahman p.31 HEMMATJOU, Roghayeh p.31 HIDAYAT, Yosi Agustina p.38 HISJAM, Muhammad p.43 HO, W. I. p.44 HO, William p.77 HONG, Jungwan p.72 HONG, Sheng-Wen p.74 HONG, T.K. p.46 HONG, Xueying p.81 HOOSHANGI TABRIZI, P. p.53 HOSSAIN, Md. Shahriar Jahan p.44 HOSSEIN MIRZAEI, Ali p.37 HOU, Jie p.85 HOU, Shiwang p.46 HOWSAWI, Eskander p.48 HSIAO, Shu-Hwa p.67 HSIEH, Chia-Lin p.39 HSU, Chia-Wei p.67 HSU, Wei-Lun p.65 HU, Kae Kuen p.65 HU, Kaishun p.46 HU, Qingpei p.75 HU, Xiaofeng p.72 HU, Xiaoming p.67 HUA, Dingguo p.75 HUANG, Boray p.76 HUANG, C. M. p.61 HUANG, George Q. p.80 HUANG, Huiling p.62 HUANG, Joshua Zhexue p.35 HUANG, Mu-Hsuan p.78 HUANG, Pengpeng p.54 HUANG, Rong-Hwa p.36, 49 HUANG, Kong-Hwa p.36, HUANG, T. Y. p.61 HUANG, Yilun p.51 HUANG, Yin-Chi p.31 HUANG, Yi-Shun p.32 HUANG, Yong p.56 HUANG, Yuan-Kuei p.38 HUNG, Chia-Liang p.84, 56 HUNG, Ching-Tsung p.83 HUNG, Hsin-Hua p.69 HUSNIAH, Hennie p.76 HYPPANEN, Sakari p.65

I

INOUE, Toshihiro p.61 ISHIDA, Kenji p.75 ISKANDAR, Bermawi p.76 ISMAIL, Hossam S. p.79 ISMAIL, K. p.77 IZADBAKHSH, Hamidreza p.70

J

JACINTO, Celeste p.64, 59 JAFARI, Mostafa p.77 JAIN, Rakesh p.76 JAIN, Vipul p.58 JAMSHIDI, Rasul p.57 JANARDHANA, G. Ranga p.72 JANTHONG, Nattawut p.62 JAVADIAN, Nikbakhsh p.63 JEHANGIR, Muhammad p.48 JEYAPAUL, R. p.53 JHA, P.C. p.41, 83 JIANG, Jun p.76 JIANG, Tongmin p.67 JIANG, Zhou p.85 JIAO, Minghai p.81 JIAO, Roger p.77 JIMOH, Adisa p.52 JIN, Kai p.66 JING, Hong p.75 JITTAMAI, Phongchai p.36 JOHANSSON, Bo p.42 JOHANSSON, Jan p.42, 77 JOLAI, Fariborz p.58 JUNIOR, Milton Vieira p.48, 47

K

KAHANGAMAGE, Udaya p.82 KAJIKAWA, Yuya p.67, 73 KALAWSKY, Roy p.79 KALISCHEWSKI, Kathrin p.64 KALLEL, Omar p.66 KAMAGAEW, Andreas p.64 KAMALZADEH, Mohamad p.46 KAMPKER, Achim p.64 KAMRAN, Fariza p.46 KANGWANSURA, Thirapan p.36 . KANT, R. p.57, 61 KAPUR, Pramod Kumar p.35, 75 KASEMSET, Chompoonoot p.63 KAZEMI, Mohammad p.63 KAZEMI, Mohammad Sadeq p.63 KHAMFOROUSH, Mehrdad p.47 KHAN, A.I. p.42 KHAN, I.A. p.80 KHANLARZADE, Narges p.37 KHOEI, Mohammad Reza p.39 KHOH, Soo Beng p.77 KHOLOPANE, Pulek p.52 KHORRAMI, Javad p.63 KHOSHALHAN, Farid p.58 KHRISNADEWI, Arlene p.38 KIA, Reza p.63 KIM, Byung Hwan p.62 KIMURA, Fuminori p.33 KING, Moritz p.44 KIRIKLIDIS, Christos p.55 KIRYTOPOULOS, Konstantios p.55 KOH, Niak Wu p.57 KOHLBACHER, Markus p.69 KOLTER, Denise p.78 KOOSHA, Mehdi p.74 KORKUSUZ, Duygu p.73 KORTELAINEN, Samuli p.65 KOSALA, Wathavana Vithanage Randika p.82, 53 KOSHIO, Atsushi p.59 KOTZE, Paula p.60 KRISHNAN, Girish p.65 KRONES, Manuela p.56 KRUEGER, Jens p.60 KRUSHINSKY, Dimitry p.40 KUAH, Chuen Tse p.35 KUAN, Chung-Huei p.78 KUMAR, Arun p.57 KUMAR, J. Ajith p.78 KUMAR, K. S. Jaya p.72 KUMAR, M. Senthil p.72 KUMAR, Rupesh p.76 KUMAR, Sanjay p.65 KUMAR, Sunand p.42

KUMAR, Usha Anantha p.31 KUO, Chien-Liang p.65 KUO, R. J. p.45 KUO, Shan-Jan p.56 KUO, Su-Hui p.51 KUO, Tsen-I p.69 KURNIAWAN, Bobby p.43 KWOK, C. T. p.44 KWON, James Yongjin p.72

LACKES, Richard p.58

L

LAHENIUS, Katja p.44 LAI, Changtao p.56 LAI, Hung Chih p.65 LAI, M. F. p.61 LAILI, Yuanjun p.85 LAIMITTAL, Murari p.37 LANGOVE, Naseebullah p.48 LARA AVILA, Laura Paulina p.68 LARSEN, Erik p.80 LAU, Antonio p.73 LAU, Henry p.33 LAU, Hoong Chuin p.36 LAU, KK p.44 LAURENCE, p.43 LE, Thanh-Son p.48 LEE, Bee Leng p.67 LEE, Carman Ka Man p.34, 60 LEE, D.H. p.68 LEE, E.W. p.32 LEONG, Kah Fai p.40 LETTERA, Gianni p.66 LEU, Jun-Der p.38 LEUS, Roel p.34 LEVITIN, Gregory p.75 LEVNER, Eugene p.51 LEYER, Michael p.54 LI, Fei p.56 LI, Feng-Chia p.52, 74, 72 LI, Hua p.66 LI, Kai-Way p.42 LI, Lili p.71 LI, Mingkun p.57 LI, S.K. p.44 LI, Shan p.47 LI, Shiying p.57 LI, Shu-Min p.57 LI, Vincent p.44 LI, W. T. p.84 LI, Xiang p.35 LI, Xiaoyang p.67 LI, Xin p.81, 72 LIAN, Zhaotong p.72 LIANG, Liang p.62 LIAO, Hongwei p.32 LIAO, Shu-Hsien p.71, 65 LIEN, Ching-Yu p.67 LIM, Roland p.79 LIM, Roland Y. G. p.57 LIM, Ronald p.32 LIMWANICH, Budtree p.81 LIN, Cheng-Shih p.69 LIN, Chia-Ching p.52, 72 LIN, Chien Chiang p.65 LIN, Hung-Tso p.31 LIN, Shieu-Hong p.60 LIN, Siou-Zih p.60 LIN, Tyrone T. p.31, 33, 32 LIN, Weidong p.58 LIN, Yu-tzeng p.50 LINDEMANN, Udo p.46, 51, 47, 44, 68 LING, Shih Fu p.38 LIU, Bor-Shong p.42 LIU, Fang p.78 LIU, Fujiang p.85 LIU, Guanmin p.82 LIU, Minxia p.83 LIU, Min-xia p.82 LIU, Yongjiang p.46

LO, Huey-hsi p.31 LO STORTO, Corrado p.64 LOPUCH, Kayla p.78 LOUREIRO, Geilson p.69, 47 LOW, Joyce M.W. p.34 LU, Guanghe p.54 LU, Jiping p.54 LU, Jiping p.54 LU, Qiang p.67, 81, 71, 85 LU, Qing p.37 LU, Wei-Jun p.38 LUCATO, Wagner C. p.48, 47 LUO, Yongliang p.84 LV, YaQiong p.60

Μ

LV, Youlong p.82

MA, Jianhong p.49 MAATTA, Salla p.44 MACCHIAROLI, Roberto p.68 MACHADO, Virgínia p.58, 39 MAEDA, Akira p.33 MAHADEVAN, B. p.71 MALAYERI, Samira Sarafi p.45 MALIHI, Ehsan p.83 MALIK, Mohsin p.68 MANSOOR, Saeed p.39 MAO, Hong p.33, 51 MARIAN, Romeo p.83, 68 MARNEWICK, Annlize p.42 MARRA, Marianna p.77 MARTIN, Patrick p.77 MARXT, Christian p.77 MASI, Donato p.64, 59 MAT SAMAN, Muhamad Zameri p.31, 39 MATSUHISA, Takashi p.36 MBOHWA, Charles p.71, 79 MEDEIROS, Denise p.33 MELO, Renata Maciel de p.33 MERWE, Alta Van Der p.60 MHLANGA, Samson p.79 MIAO, Zehua p.48 MICHELI, Guido Jacopo Luca p.64, 59 MILIMONFARED, Roohollah p.83, 68 MINSHALL, Tim p.61 MIRANDA, Salvatore p.68 MOGHIMI, A p.46 MOGOUIE, Hamed p.73 MOHAMED, Rozlini p.49 MOHD SALLEH, Rohayu p.54 MOHD YUSOF, Shari p.62 MOHD-ZAINAL, Affandi p.43 MOIN, Noor Hasnah p.36 MONTAZERI, Mahdiyeh p.46 MOOI, Herman G. p.55 MOON, K.T. p.59 MORI, Junichi p.73 MOSHIRI, Behzad p.31 MOSLEMI, Amir p.63 MOTA, Caroline p.56, 33 MUELLER, Egon p.64, 56 MUELLER, Juergen p.60 MUKHERJEE, Indrajit p.74 MURAKAMI, Keisuke p.34 MURUGAN, Sharmeeni p.74 MUTINGI, Michael p.79 MUTZE-NIEWOHNER, Susanne p.78

Ν

NACHIAPPAN, S.P. p.80 NAHAVANDI, Nasim p.72, 31 NAKADE, Koichi p.34 NAKANDALA, Dilupa p.33 NAKHAI, I. p.37, 31 NAN, Cen p.76 NAZARI, Ahad p.56 NAZARI, Mahboobeh p.39 NAZEMI, Jamshid p.41 NDLOVU, Jabulani p.79 NEE, Carsten p.64 NEGHAB, Mohammadal A. Pirayesh p.40 NG, Kam-Choi p.55, 38 NG, Kien Ming p.76 NG, Poh Kiat p.48, 49 NG, S.H. p.79, 75, 67 NGAN, Shing-Chung p.48 NIAKAN, Fardad p.68 NICKEL, Rouven p.33 NIELEN, Alexander p.78 NIKGHADAM, Shahrzad p.75 NISHIMURA, Shintaro p.75 NOGHONDARIAN, Kazem p.69 NOOROSSANA, Rassoul p.70 NUNES, Isabel L. p.80 NUR BÁHAGIA, Senator p.39 NUREIZE, Arbaiy p.51

0

OBERHOFER, Peter p.73 OJANEN, Ville p.65 OKUWADA, Kumi p.44 OLANREWAJU, Oludolapo p.52 OMAR, Mohamed K. p.36, 34, 74 ONCAN, Temel p.83 OOI, Ghee Beng p.77 ORAWSKI, Robert p.51 OSMAN, Mojahid F. Saeed p.35 OSTASZEWSKI, Krzysztof M. p.33, 51 OVERMEYER, Ludger p.45 OWLIA, Mohammad Saleh p.69, 77, 46

P

PALIWAL, Mukta p.31 PAN, Li p.35 PAN, Rong p.69 PANICKER, Vinay V. p.65 PANJA, Subhash Chandra p.76 PARAMASIVAM, S. p.72 PARIDA, Aditya p.76 PARK, Taezoon p.52 PARK, Yongmin p.72 PARVIZIAN, Jamshid p.66 PASARIBU, Udjianna S. p.76 PATEL, D. P. p.61 PATHUMNAKUL, Supachai p.40, PATIL, Kunal p.66 PAZOKI, M. p.58 PEI, Zhi p.32 PENG, Jing p.48 PENG, Rui p.76 PENG, Xiaoying p.49 PHAM, Vu p.83 PIEWTHONGNGAM, Kullapapruk p.40, 39 PILKÍNGTON, Alan p.69 PIPLANI, Rajesh p.34 PLATTNER, Hasso p.60 POH, Kim Leng p.76 POOLTON, Jenny p.79 POORMOAIED, Saeed p.40 POTTHAST, Jens-Michael p.33 PRASANNA, N. K. K. p.75 PRASSE, Christian p.64 PRETORIUS, H.C. p.42, 54 PRETORIUS, Leon p.42, 54 PROMBANPONG, Suksan p.41 PUGA-LEAL, Rogerio p.66 PUJARA, A. A. p.57

PUTERI UTAMA, Christine p.43

Q

QIAN, Hanbo p.75 QIN, Sheng Feng p.59 QIU, Min p.68 QIU, Xuan p.80

R

RADFAR, Reza p.45 RAHARJO, Hendry p.73 RAHI, M-Javad p.47 RAHIMZADE, Kourosh p.47 RAHMAN, Mohammad Mahmudur p.66 RAJESRI, G. p.71 RAM, Bala p.35 RAMAKRISHNAN, Kumaran p.34 RAMAN, Dhamodharan p.53 RAMAN, VVR p.38 RAMASAMY, Valliappan p.71 RASJIDIN, Roesfiansjah p.57 RATHOD, Vijay p.76 RATHORE, Ajay Pal Singh p.76 RAZ, David p.36 REHMAN, Mubashir p.42 REINHART, Gunther p.41 REN, Long p.81 REN, Zhiyun p.84 REZAEE NIK, Ebrahim p.56 RICHARD, Philippe p.84 RIEDEL, Ralph p.56 RINKHAM, C. p.63 RISSING, Lutz p.45 ROE, Michael p.52 ROHANI, Jafri Mohd p.43 ROKOU, Elena p.55 ROLLO, Alessandra p.66 ROSLI, D'oria p.84 RUAN, Jian p.59 RUI, P. p.75, 67

S

SAADET, Narthan Cemal p.66 SADEH, Arik p.36 SAFAIAN, Mohammad Reza p.70 SAHIN, Guvenc p.83 SAHIN, Mustafa p.83 SAHRAEIAN, Rashed p.63 SAIF, Abdul-Wahid A. p.79 SAKATA, Ichiro p.61, 73 SAMAEI, Farshid p.74 SAMARANAYAKE, Premaratne p.33 SAMBU POTTY, Narayanan p.55 SAMMIE, Batanai p.71 SANDA, Mohammed Aminu p.42, 77 SANGWAN, Kuldip Singh p.43 SANTOS, Carolina p.39 SARKER, Ruhul p.34 SARRAZIN, Renaud p.52 SARYAZDI, Mohammad Dehghani p.69 SASAKI, Hajime p.61 SASAKI, Kazuya p.44 SCAFOGLIERÍ, Aldo p.42 SCHENKL, Sebastian A. p.51 SCHLICK, Christopher M. p.78 SCHMITT, Robert p.40 SCHUH, G. p.64

SEENPIPAT, Waraporn p.41 SELAOUTI, Anis p.33 SHABTAY, Dvir p.51 SHAHRIARI, Mohammad p.59 SHARAFI, Zahra p.66 SHARIF, Shamshuritawati p.41 SHEIKHZADEH, Alireza p.49 SHEN, Z.Q. p.64 SHENG, Y.Z. p.64 SHI, Yongjiang p.85 SHIRAKAWA, Nobuyuki p.44 SHIROUYEHZAD, Hadi p.53 SHOU, Yongyi p.82, 55, 56, 51 SHUAI, Ying p.38 SI, Shubin p.82 SIADAT, Ali p.77 SIEPERMANN, Markus p.58 SILVA, Adalberto Coelho p.69, 47 SILVA, Jose Martinele A. p.47 SINGH, M. D. p.57, 61 SINGH, Mohit p.80 SINGH, Ompal p.35 SINGH, Sarbjeet p.42 SINGH, Yogender p.41 SINGHAL, Piyush p.37 SIRIRAM, Raj p.60 SIROVETNUKUL, Ronnachai p.45 SISWANTO, Nurhadi p.34 SIVASANKAR, S. p.53 SLOMP, Jannes p.40, 72 SOLEIMAN GARMABAKI, Amir Hossein p.75 SONG, Dongping p.52 SONG, Hao p.54 SONI, Umang p.58 SOTER, Stefan p.64 SOUZA, Robert De p.37 SPIEGEL, Markus p.77 SRIDHARAN, R p.65 STEENHUIS, Harm-Jan p.78 STENSTROM, Christer p.76 SU, Jun p.61 SUBRAMANIAN, A. M. p.49 SUGANUMA, Takuya p.79 SUN, Hongyi p.72 SUN, Ke p.67 SUN, Shudong p.81 SUPITHAK, Anchalee p.36 SUTOPO, Wahyudi p.43, 39 SUZUKI, Kiyoshi p.73 SUZUKI, Takayuki p.33 SYRETT, Laura p.78

Т

TAKAHASHI, Hirotaka p.80 TALLA NOBIBON, Fabrice p.34 TAN, Kay-Chuan p.65 TAN, Puay Siew p.71 TAN, Runhua p.49 TANG, Chia-Hui p.82 TANG, Loon Ching p.75 TANG, Shuiyuan p.54 TANHAIE, Fahimeh p.72 TANNOUS, O. p.67 TAO, Fei p.84, 85 TAPLIN, John p.68 TAROKH, Mohamad Jafar p.46 TASHIRO, Hisato p.73 TAVAKKOLI-MOGHADDA M, Reza p.68, 39, 63 TEH, Pei-Lee p.71 TEN HOMPEL, Michael p.64 TEO, Kwong Meng p.76 TEWARI, Veena p.38 TEY, Voon S. p.79 TEZUKA, Taro p.33

THUANKAEWSING, Surached p.39 TIAN, Tian p.39 TIAN, Xueying p.62 TOHA, Isa Setiasyah p.53 TOLLENAERE, Michel p.73 TRAUTMANN, Norbert p.41, 56 TRESIGNIE, Jonathan p.42 TRIVELLAS, Panagiotis p.84 TRUCCO, Paolo p.59 TSAI, Chih-Fong p.81 TSAI, Shuo-Chang p.57 TSENG, Hsien-Yu p.42 TSUI, K. L. p.80

U

USHIKUBO, Masayoshi p.73

v

V. MANALO, Marivic p.69 VAN DE VONDER, Stijn p.55 VAN RENSBURG, Antonie p.80 VAN WYNGAARD, C. Jurie p.54 VANDERHAEGEN, Frederic p.84 VAY, Henrik p.56 VELOZ, Christian p.57 VILASINI, Nimesha p.82, 53 VRIES, Marne De p.60

W

WAN, Guowei p.61 WANG, Bing p.81 WANG, Chengchao p.55 WANG, Chun-Chieh p.60 WANG, Feng Yu p.79, 32 WANG, Haiyan p.84 WANG, Jinhui p.84 WANG, Junqiang p.81 WANG, Lina p.79 WANG, Liya p.47 WANG, Lizhi p.69, 67 WANG, Min p.67 WANG, Peng-Kai p.74 WANG, Shu p.65 WANG, Shuo p.81 WANG, Tianqi p.48 WANG, Tien-Chin p.51 WANG, Weiping p.46 WANG, Xinping p.38 WANG, Xuefeng p.68 WANG, Yizhen p.54 WANG, Yuling p.51 WANG, Zimo p.75 WARD, David p.59 WATADA, Junzo p.51, 49 WATTANAPORNPROM, Warin p.45 WEI, Jia Hua p.35 WEITLANER, Doris p.69 WEN, Haijun p.46 WEN, Pei-cheng p.31 WENG, Wei p.40 WINDIARTI, Ika p.45 WITHANAGE, Chathura p.52 WONG, Kuan Yew p.37, 35, 31, 39 WONG, P.K. p.49 WONG, S. Y. p.80 WONG, Seng Fat p.44 WONG, T. C. p.48, 80 WONGSATHAN, Rati p.81

WONNEBERGER, Kai-Uwe p.64 WU, Chi-Chuan p.65 WU, Hongtao p.49 WU, Jianjun p.54 WU, Mingxing p.47 WU, Shaomin p.75 WU, Wei-Cheng p.33 WU, Yen-Kwan p.65 WU, Yi-Shuang p.57 WU, Yi-Shuang p.57 WU, Yunna p.56 WU, Zengyuan p.78 WU, Zhang p.73, 67 WUANG, Min-Sun p.49 WUDHIKARN, Ratapol p.54 WURZ, Marc C. p.45

х

XIA, Peng p.82 XIANG, Qing p.85 XIANG, Yiming p.71 XIE, Fang p.65 XIE, Guobiao p.71 XIE, Min p.75, 67 XING, L. p.67 XU, Guannan p.61 XU, Laura Xiao Xia p.79,32 XU, M. p.80 XU, Qianli p.82, 81 XU, Suxiu p.67, 81, 71 XU, Wei p.52 XUE, Qing p.83, 82

Y

YADAV, Om Prakash p.76 YAMAMOTO, Satoru p.67 YAN, Bingwen p.50 YAN, Jihong p.75 YAN, Nina p.39 YAN, Ping p.81 YAN, Wen Jing p.71 YAN, Yan p.75 YANG, Chang-Lin p.49 YANG, Hongtao p.62 YANG, Jun p.74 YANG, Q.Z. p.64 YANG, Ting p.47 YANG, Yating p.32 YANG, Zhixin p.44 YANG, Zijiang p.78, 62 YAO, Xiaotian p.81 YAZDANI, Khashayar p.77 YAZDANI RASHVANLOUEI, Kourosh p.77 YE, Zhisheng p.76, 75 YEH, Chun-Wu p.83 YEH, Li-Lon p.74 YEO, Wee Meng p.34 YOON, Chui Young p.62 YOSHIDA, Shotaro p.80 YOUSEFI, B. p.37 YU, Han p.83 YU, Shun-Chi p.36 YUAN, Jun p.79 YUAN, Peng p.48 YUAN, Xue-Ming p.34, 38 YUSOFF, Syahidah p.43

Ζ

ZAHN, Thimo p.85 ZAILANI, Suhaiza p.46 ZAKERI, Roja p.41 ZAKUAN, Norhayati p.39 ZANDIEH, M. p.53 ZARE, Yahya p.77 ZARINBAL, Amir p.70 ZARINBAL, Marzieh p.70 ZARZYCKI, Michal p.32

ZEGORDI, Seved Hessameddin p.56, 37 ZEIER, Alexander p.60 ZEYNIVAND, Mehdi p.66 ZHANG, Dinghua p.47 ZHANG, Faping p.75 ZHANG, Hao p.46 ZHANG, Jie p.82 ZHANG, Jinling p.49 ZHANG, Li p.50 ZHANG, Lin p.84, 85 ZHANG, Linda p.77, 82, 81, 51 ZHANG, Qizhong p.54 ZHANG, Stephen p.68 ZHANG, Xinwei p.69 ZHANG, Yingfeng p.81 ZHANG, Zhicong p.46 ZHAO, Lindu p.38 ZHAO, Ning p.72 ZHAO, Shi Tao p.38 ZHAO, Xiaoting p.62 ZHAO, Yang Yang p.49 ZHAO, Yi p.84 ZHENG, Gang p.78 ZHENG, Li p.32, 85 ZHENG, Luoping p.48 ZHENG, Suli p.78 ZHENG, Y. p.35 ZHI, Qiang p.61 ZHONG, Shouyan p.46 ZHONG, Xin p.71 ZHOU, Yuan p.61 ZHU, Donghua p.68 ZHU, Jie p.71 ZHU, Xiaobo p.81 ZHUANG, Xiaotian p.69, 67 ZOU, Pingyuan p.46 ZUO, Pangli p.84

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Transport Services

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The conference will be held in the hotel Furama River Front. FURAMA RIVERFRONT SINGAPORE 405 Havelock Road Singapore 169633 Tel: (65) 6333 8898 Fax: (65) 6733 1588 Website: www.furama.com

What to do and Where to go in Singapore Own Time Own Target or Book A Tour at the Hotel Tour Desk

Sight-seeing

Sentosa

Sentosa Island is home to the Resorts World Integrated Resort, as well as a theme park, wildlife reserves, gardens, animals parks, adventure rides, restaurants and spas, ensuring non-stop fun around the clock.

Getting There: Take the Sentosa Bus or Sentosa Express from Harbourfront Center Interchange (next to Harbourfront MRT station)

Operating Hours: Whole Day Website: http://www.sentosa.com.sg



Universal Studios Singapore @ Resorts World Sentosa (Within Sentosa)

Enter the thrilling world of movie magic as you "ride the movies®" on roller coasters and other movie-themed attractions. Be dazzled and delighted by an immersive entertainment experience that brings the silver screen to life.

Getting There: Alight at Harbourfront MRT station and transfer to RWS 8 or take a Sentosa Express then alight at Waterfront Station.

Operating Hours: 9 am to 6 pm

Website: http://www.rwsentosa.com/Attractions/UniversalStudiosSingapore



Gaming @ Resorts World Sentosa (Within Sentosa)

Be dazzled by one of the world's newest gaming halls. Whether you relish a roll of the dice, appreciate good food, or simply love heart-pumping entertainment, Resorts World's gaming floor is the place where it all comes together.

*Note: Please show proof for foreign patrons for free entry. Dress code is smart casual

Getting There: Alight at Harbourfront MRT station and transfer to RWS 8 or take a Sentosa Express then alight at Waterfront Station.

Operating Hours: Whole day

Website: http://www.rwsentosa.com/language/en-US/Gaming



National Museum of Singapore

With a rich history dating back to its inception in 1887, the National Museum of Singapore is Singapore's oldest museum with the youngest and most innovative soul. The galleries adopt cutting-edge and varied ways of presenting history and culture to redefine conventional museum experience.

Getting There: Alight at Dhoby Ghaut MRT station and take a 5-minute walk.

Operating Hours: 10am – 6 pm Daily

Website: http://www.nationalmuseum.sg



Singapore Flyer

Officially launched in 2008, Singapore Flyer stands at 165 meters, with a diameter of 150 meters, making it the tallest Giant Observation Wheel in the world. Singapore Flyer offers a breathtaking panorama of the shimmering Marina Bay waterfront and historical landmarks dotting the city skyline

Getting There: Alight at City Hall MRT station then cross the road to Coleman Street. Board the shuttle bus which swings by every half an hour from 10am – 10pm at the bus stop next to St. Andrew's Cathedral.

Operating Hours: 8.30 am – 10.30 pm Daily

Website: http://www.singaporeflyer.com



Marina Bay Sands

Marina Bay Sands features three cascading hotel towers topped by an extraordianary sky park, 'floating' crystal pavilions, a lotus-inspired Museum, retail stores featuring cuttingedge labels and international luxury brands, trendy Celebrity Chef restaurants, endless entertainment at the theaters, the hottest night clubs and a Las Vegas- Style casino.

Getting There: Alight at Marina Bay MRT station and take a 5 to 10-minute walk.

Operating Hours: Whole day

Website: http://www.marinabaysands.com



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Systems Engineering and Engineering Management

In addition to other engineering programmes, SEEM offers a full suite of IEEM programmes from **BEng** to **EngD**.

Bachelor of Engineering (Hons) in Industrial Engineering and Engineering Management (BEIEEM)

This programme aims to equip students with problem solving, technical and managerial skills and knowledge related to Industrial Engineering and Engineering Management and to prepare them for professional careers in managing manufacturing, engineering and other technology oriented services.

Master of Science in Engineering Management (MSEM)

The programme is designed for engineers with the aim to meet the education needs of practising engineering managers by developing their managerial skills, specialist expertise and functional capability in the context of Engineering Management.

The uniqueness of the programme as compared with other management programmes lies in the following:

Engineering Management Context

While the management skills are common, the engineering managers manage activities with a strong engineering / technical content. This programme provides the strong engineering management context.

Engineering Doctorate (EngD)

The Engineering Doctorate is a professional doctorate degree. The Engineering Doctorate program at SEEM of CityU focuses on Engineering Management. It is a part-time programme designed for senior managers and engineers in all sorts of Hong Kong / China organizations. The programme aims at developing the candidates' creative thinking and overall capability to apply innovative technologies and advanced management methods to meet the long-term strategic needs of their organizations.

The EngD programme was launched in 2000 and has attracted more than 80 senior engineering managers and executives from engineering companies, educational institutes and governmental organizations in Hong Kong / China, leading to a widening network for engineering management, technological innovation, entrepreneurship and industry-university collaboration.

ENQUIRIES

Department of Systems Engineering and Engineering Management (SEEM) City University of Hong Kong **Tel:** (852) 3442 9321 **Fax:** (852) 3442 0173 **Email:** seemgo@cityu.edu.hk www.cityu.edu.hk/seem/ The graduates will develop:

- * a broad understanding of the principles and technologies related to engineering and manufacturing;
- * the ability to conceptualize, analyze, synthesize and implement industrial systems and services; and
- * the ability to efficiently manage manufacturing, engineering and other technology oriented systems.

Functional Needs of Engineering Management

The functions of general and engineering managers are significantly different. General managers are oriented towards business issues. Engineering managers undertake professional functions such as engineering project management, engineering operations planning and control and product / services development. This programme aims to develop a critical understanding of the academic and professional knowledge required in the execution of these engineering management functions.

Empathy

Engineers have special strengths and weaknesses. This programme focuses on the characteristics of engineers as a group. This facilitates the concentration and empathy required for the successful transition from the role of engineers to that of engineering managers.

Provide world-class education

Maximize students' potentials

Capture global opportunities

DEPARTMENT OF INDUSTRIAL ENGINEERING AND LOGISTICS MANAGEMENT The Hong Kong University of Science and Technology www.ielm.ust.hk



Since our establishment in 1993, the IELM Department has made notable strides. Our relentless pursuit of excellence in teaching and research has received international recognition. Joining the IELM Department at HKUST as a postgraduate student gives you the opportunity to take up leadership roles in different businesses from logistics management, quality assurance, product development and advanced manufacturing. We emphasize strategic issues, integration and customer-orientation to enable our graduates to have a comprehensive grasp of both technological and managerial aspects of contemporary issues.





Research in IELM falls along two themes: Logistics and Supply Chain Management, and Product Design and Manufacturing. Within these focuses, we investigate a range of subjects encompassing Logistics and Supply Chain Management, Service and Quality Management, Product Design and Development, Human Factors and Ergonomics, and Advanced Manufacturing Systems. The Department has a host of state-of-the-art facilities to support our research. Government and industry funded projects are on-going. Collaborations with renowned universities and professional institutions have also been established.

2009 INFORMS INTERNATIONAL CONFERENCE ON SERVICE SCIENCE



For admissions and further details, visit http://www.ust.hk/admissions

PROGRAMS IN SYSTEMS AND ENGINEERING MANAGEMENT DIVISION Nanyang Technological University, Singapore



The Division of Systems and Engineering Management (SEM) is part of the School of Mechanical and Aerospace Engineering, which has 150 faculty members, and is one of the largest engineering Schools in the world: see, www.ntu.edu.sg/mae/.

Systems and Engineering Management includes topics such as Supply Chain and Logistics Management, Service systems including healthcare service, Human Factor Engineering, Project Management in Supply chain performance, Manufacturing systems and Design and Manufacturing of Mass Customized Products.

In the SEM Division there are 19 faculty members in the following areas of expertise:

- I. Systems Engineering and Operations Research
- 2. Design Studies
- 3. Human Factors Engineering
- 4. Quality and Reliability

Corresponding to these interests there are three Research Centres in: Human Factors & Ergonomics, Supply Chain Management and Project Management and Advancement.

M.Sc. Programs

The Master of Science program provides graduate level education. It is conducted both part-time (for people who work) and full-time. Applications for admission to the program are invited once a year through announcements in the press prior to the commencement of the program in August.

There are three M.Sc. Programs:

- 1. M.Sc. Logistics
- 2. M.Sc. Systems and Project Management
- 3. M.Sc. Smart Product Design

Research Programs

Ph.D. and M.Eng. are research-oriented programs. Here the students will take several courses, but most of the work is on research. The student will work together with a supervisor, who will help to define a research topic and guide the student.

Typically a student will take a M.Eng. degree and then continue to take a Ph.D. However, applicants with an outstanding bachelor's degree can be admitted directly into the Ph.D. program.

INDUSTRIAL AND SYSTEMS ENGINEERING AT THE NATIONAL UNIVERSITY OF SINGAPORE



BUILT upon a collection of methodological tools brought together to effect an integrated or total approach to problem-solving in engineering, with productivity and quality improvement as its overall objectives.

KNOWLEDGE domain covers broad areas including engineering, mathematics, statistics, computing, social science, and management. The ISE discipline brings a holistic perspective to problem solving within a systems context. http://www.ise.nus.edu.sg











Focus of the Department:

- Manufacturing and engineering industries
- Logistics industry
- Defence industry
- Service industry

Research trusts of the Department:

- Logistics and Supply Chain Management
- Quality Engineering
- Service and Innovation Management
- Systems Modeling and Optimization

Programs of the Department:

- Bachelor of Engineering (Industrial and Systems Engineering)
- Bachelor of Technology (Industrial and Management Engineering)
- Master of Science (Industrial and Systems Engineering)
- Master of Engineering and Doctor of Philosophy

The Industrial and Systems Engineering Department at the National University of Singapore has come a long way since its formation in 1972. Today, we are a comprehensive department offering the BEng, BTech, MSc, MEng, and PhD degree programs. As the only ISE department in Singapore, we offer a rigorous and yet flexible curriculum full of exciting possibilities ranging from industry-inspired design projects to overseas attachments. In the coming years, ISE will actively recruit, develop and retain talent with the passion to bring out a new breed of engineers who possess the analytical skills to deal with problems holistically. Together, we reinforce NUS' leadership in quality education and research, and develop international visibility.



A premier university in Asia, the Singapore Management University (SMU) is internationally recognised for its world class research and distinguished teaching. Established in 2000, SMU's mission is to generate leading edge research with global impact and produce broadbased, creative and entrepreneurial leaders for the knowledge-based economy. It is known to interactive be а pioneer for its and technologically-enabled pedagogy of seminar-



style teaching in small class sizes which remains its unique hallmark. Home to 7,000 students, SMU comprises six schools: School of Accountancy, Lee Kong Chian School of Business, School of Economics, School of Information Systems, School of Law and School of Social Sciences, offering a wide range of bachelor's, master's and PhD degree programmes in business and other disciplines.



Our suite of Postgraduate Professional Programmes is tailored to suit the needs of students, industry and society in this ever-changing landscape. The Masters in Innovation is a new programme by the Lee Kong Chian School of Business. This programme develops participants from diverse industries into leaders and change agents in the practice of Innovation and value creation.

With an emphasis on generating rigorous, high impact crossdisciplinary research that addresses Asian issues of global relevance, SMU faculty collaborate with leading foreign researchers as well as partners in the business community and public sector through its research institutes and centres. Through executive education, the university provides public and customised training for working professionals in meeting the needs of the economy. Close relationships with leading universities, including The Wharton School,





Carnegie Mellon, the University of Pennsylvania and the University of

Chicago's Booth School of Business, allow SMU to draw on their academic and research strengths in various collaborations. The SMU city campus is a state-of-the art facility located in the heart of downtown Singapore, fostering strategic linkages with the business and wider community. <u>www.smu.edu.sg</u>

University of Macau http://www.umac.mo (New campus in Hengqin Island will be completed in 2013)



The University of Macau (UM) was founded in 1981 as a private institution by the name of University of East Asia. Through over two decades' development, it has become a leading university in Macao. UM offers around 100 bachelor's, master's and PhD programs with English being the main medium of instruction through various academic units and currently has over 6,900 students and over 400 teaching staff. The start of construction of the new campus signaled a new era in the development of Macao's higher education and presented UM with unprecedented development opportunities. Covering an area of around 1 km², the new campus will be nearly 20 times larger than the existing campus and will be able to accommodate approximately 10,000 students. The "residential college system" adopted by some of the world's top universities will be introduced in the new campus to complement the faculty system, which will constitute one of the highlights of the new campus.

Approximately eight faculties, including Faculty of Arts, Faculty of Social Sciences, Faculty of Science and Technology, Faculty of Business Administration, Faculty of Law, Faculty of Education, and Faculty of Life Science and Health, will be established, in order to offer more choices for local secondary school graduates and to nurture professionals in various fields to meet the needs of the moderate industrial diversification of Macao. For instance, the establishment of the logistics and service management program is in the preparation in order to develop the logistics industry in Macau and Pearl River Delta Area.

University of Macau New Campus Site Inspection



Faculty of Business Administration: Finance, Accounting, E-Business, Global Business, Management and Marketing, Commercial Gaming Management, Logistics and Service Management (to be developed)

Faculty of Education: Information and Communication Technology in Education, Educational Research on Well-Rounded Growth and Development, Educational Testing and Assessment

Faculty of Science and Technology: Computer and Information, Engineering Civil and Environmental, Engineering Electrical and Electronics, Electromechanical

Faculty of Social Sciences and Humanities: History, Psychology, Sociology, Portuguese, Chinese, English, Communication, Economics, Government and Public Administration

Faculty of Law: European Union Law, International Law and Comparative Law, International Business Law

Faculty of Life Science and Healthy (to be developed)