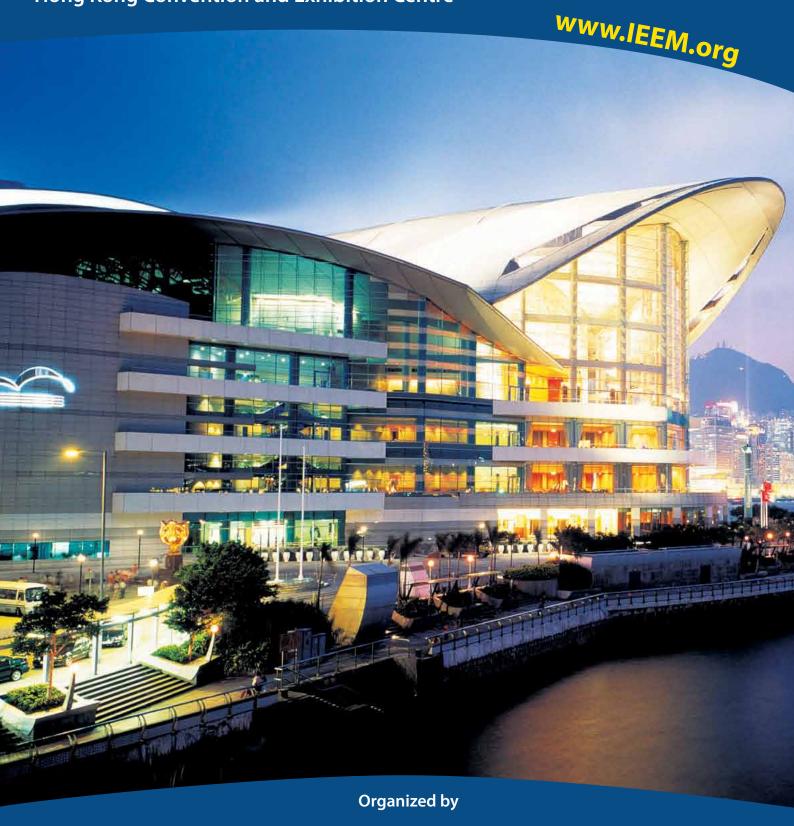


IEEM2012

10 to 13 December 2012, Hong Kong Hong Kong Convention and Exhibition Centre





IEEM 2013

10-13 DECEMBER, BANGKOK Swissotel Le Concorde

The IEEE International Conference on Industrial Engineering and Engineering Management

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Conference Venue Hong Kong Convention and Exhibition Centre

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Tel: (852) 2582 8888 E-mail: info@hkcec.com

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WELCOME MESSAGE BY CONFERENCE CHAIRS

After the continuous success of previous IEEM conferences, the organizing committee of IEEM2012 is pleased to welcome you to the 2012 IEEE International Conference on Industrial Engineering and Engineering Management in Hong Kong.

IEEM2012 received almost 1000 submissions and each paper was sent to 3-5 reviewers, and acceptance decisions were made based on at least two consistent recommendations. Our rigorous review process has helped to maintain a high standard as for the past IEEM conferences.

The organising committee would like to take this opportunity to thank all the technical programme committee and the reviewers for their contribution towards the review process. We are also grateful to all authors for their interest and participation.

Hong Kong is a vibrant and wonderfully diverse country. We wish all delegates a fruitful conference and a pleasant stay in Hong Kong.

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Organizing Chairs

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WELCOME MESSAGE BY CONFERENCE CHAIRS



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China

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KEYNOTE PRESENTATION



Tuesday – 11 Dec, 09:10 – 09:50 Room S221, Level 2

Way Kuo

President and University Distinguished Professor City University of Hong Kong, Hong Kong

Modernization of Industrial Engineering

Abstract

Industrial engineering is a mature subject. In order to keep up with the development of industrial engineering, we will have to modernize the industrial engineering discipline. Three key issues will be addressed: internationalization, updating the subjects, and forward looking.

Biography

Professor Way Kuo is President of City University of Hong Kong. A renowned expert in reliability design and modeling, he is also well-known for promoting university education on the basis of problem-driven research.

Professor Kuo is a member of US National Academy of Engineering, a member of Academia Sinica, Taiwan, and a foreign member of Chinese Academy of Engineering. Previously, he served on the senior management team of Oak Ridge National Laboratory and as the Dean of Engineering at the University of Tennessee, Knoxville, and he was the holder of the Wisenbaker Chair in Innovation at Texas A&M University. Professor Kuo has co-authored seven books on reliability and is the Editor-in-Chief of IEEE Transactions on Reliability.

"MEET-THE-EDITORS" PANEL

Tuesday - 11 Dec, 09:50 - 10:30, Room S221, Level 2 Please see Announcement Board for details.

KEYNOTE PRESENTATION



Wednesday – 12 Dec, 09:00 – 09:40 Room S221, Level 2

Raymond Leung

Chairman & CEO TDK China Co., Ltd, Hong Kong

Triumphs of Innovation and Technologies in Hong Kong

Abstract

Known to many as a leading international financial centre of the world, Hong Kong on the other hand has long been criticized for the lack of innovation and technologies to sustain its industrial growth in the future. Having founded or co-founded two highly successful hi-tech companies in HK, respectively the largest of the world for magnetic recording heads for hard disk drives and then lithium polymer batteries for consumer electronics, the author will present how innovation and technologies have prevailed, from product creations in laboratories in HK to mass production in state-of-the-art manufacturing facilities in the Pearl River Delta (PRD). An industrial engineer by training, the author will also explain the indispensable roles of industrial engineering and engineering management in the success of hi-tech manufacturing in his factories in China. This was extremely challenging in the 80's and 90's when formal industrial engineering training was essentially unavailable in China. Tsing Hua University, to say the least, had its Department of Industrial Engineering established only in 2001.

Biography

Dr. Raymond Leung has since 2005 been the Chairman and CEO of TDK China, overseeing all businesses of TDK Corporation in Greater China region including SAE Magnetics, the company he co-founded over 30 years ago and currently is the world's largest magnetic head manufacturer with an annual turnover of over US\$ 2 billion, out of the total US\$4 billion plus of the entire business portfolio under his responsibility. Dr. Leung also serves the Executive Vice President of TDK Corp, the first non-Japanese appointed for the position since the establishment of the Japanese electronics giant in 1935. Dr. Leung is widely regarded a high-tech entrepreneur with a mission of nurturing and growing the high-tech industry. In particular, he has been responsible for many technology start-ups in the region. In 1999, he founded Amperex Technology Limited (ATL) and grew it to become the world's largest suppliers of lithium polymer battery for consumer electronics. ATL became a member company of TDK in 2005, now making inroads to batteries for electric vehicles.

Dr. Leung graduated with an Engineering Doctorate (EngD) degree from City University of Hong Kong. He is very supportive of higher education, in addition to serving an adjunct professor at the Chinese University of Hong Kong, he chairs advisory committees and is court member of several universities in Hong Kong. He serves directorship and advisory roles for government bodies of HKSAR, and is economic advisor of a number of China cities and North Dakota in the USA. He co-founded OLPC Asia Pacific, the Asian chapter of the philanthropic 'One Laptop Per Child' originated from MIT. Dr. Leung's contributions to the industry, community and education have earned him many awards including Honorary Fellow and Distinguished Alumni of City University of Hong Kong, Honorary Fellow of Hong Kong University of Science and Technology, Outstanding Alumni Award of Hong Kong Polytechnic University, and Honorary Citizen of Dongguan City, PRC. He is currently a member of the 12th Dongguan Committee of Chinese People's Political Consultative Conference.

KEYNOTE PRESENTATION



Wednesday – 12 Dec, 09:40 – 10:30 Room S221, Level 2

Daniel Yeung

Senior Past President of the IEEE SMC Society; Distinguished Professor South China University of Technology, China

A Robust Machine Learning Technique for Certain Cyber Security Problems

Abstract

Cyber security is not just a governmental concern. It invades our societies, enterprises, schools, homes and private lives. Traditional machine learning techniques which are signature-based and pattern specific matching can no longer effectively defend against cyber attacks. Facing challenges of large scale network complexity, network dynamics and unbalanced normal versus anomaly data, new machine learning techniques are called for to address these problems. In this talk a mechanism to enhance the prediction capability of a supervised classification system against cyber attacks is presented. The case of the steganography/steganalysis will be presented and the general intrusion detection problem will be discussed.

Biography

Daniel Yeung is the Senior Past President of the IEEE Systems, Man and Cybernetics (SMC) Society, a Fellow of the IEEE and an IEEE Distinguished Lecturer. He received the Ph.D. degree in applied mathematics from Case Western Reserve University. In the past, he has worked as a tenured assistant professor at the School of Computer Science and Technology and an assistant professor at the Department of Mathematics, both at Rochester Institute of Technology, Rochester, New York, as the head of Management Information Unit at the Hong Kong Polytechnic University, and as the associate head/principal lecturer at the Department of Computer Science, City Polytechnic of Hong Kong. He was the chairman and a chair professor of the Department of Computing, The Hong Kong Polytechnic University. Currently he is a chair professor in the School of Computer Science and Engineering, South China University of Technology, Guangzhou, China.

He also held industrial and business positions as a Technical Specialist/Application Software Group Leader at the Computer Consoles, Inc., Rochester, New York, an Information Resource Sub-manager/Staff Engineer at the Military and Avionics Division, TRW Inc., San Diego, California, and an Information Scientist of the Information System Operation Lab, General Electric Corporate Research and Development Centre, Schenectady, New York.

His current research interests include neural-network sensitivity analysis, data mining, fuzzy sets and systems, and machine learning applications.

SPEAKER GUIDES

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 allocated time. This is essential to ensure adequate time for questions and discussions 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 outside the level 2 meeting rooms and your assigned poster board will be marked with your Paper ID. Please feel free to approach the help desk for assistance.

Tue - 11 December 2012				
Wed - 12 December 2012				
Poster Viewing from	Poster set-up from 8:30 to 10:30			
10:30 - 11:00 and 15:00 - 15:30	Poster tear down latest by 18:00			

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 contracting your 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.

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 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. IEEM2012 will not be responsible for posters and materials left on poster boards after the end of the session.

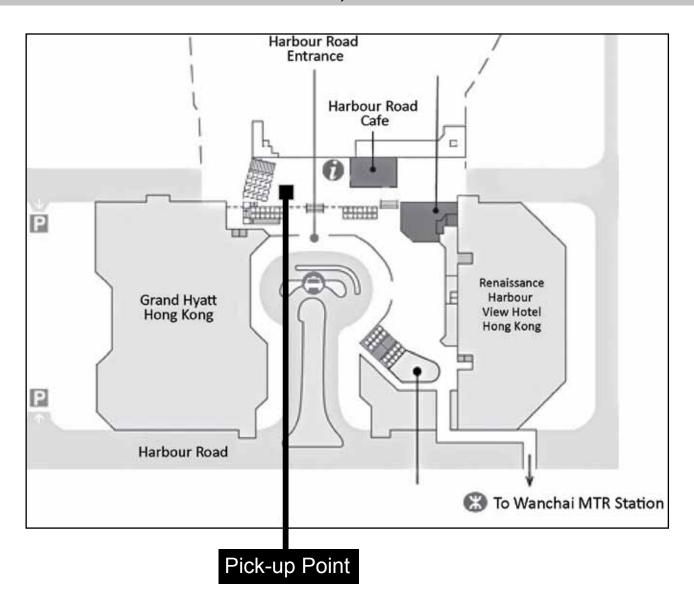
PROGRAM OVERVIEW

Time		Monday - 10 Dece	mber, 2012			
15:00 - 18:00	Delegate Arrival and Re					
16:00 – 18:00	Welcome Reception, S22	1 Level 2				
17:30 – 21:30	Pre-Conference Tour – Taste of Hong Kong by Night (Tour departs at 17:30 sharp. Please meet at the Harbour Road Entrance, Ground Floor at 17:15 and present ticket to board bus. Refer to Pg.10 for pick-up point.)					
Time		Tuesday - 11 Dece	mber, 2012			
08:00 - 08:50		er (Re-opens at 10:30 and	d closes 16:30)			
09:00 – 09:50	Opening & Keynote Presentation, S221 Level 2 Keynote Presentation: "Modernization of Industrial Engineering" Way Kuo, President and University Distinguished Professor, City University of Hong Kong, Hong Kong Pg.4					
09:50 – 10:30	"Meet-the-Editors" Panel, S221 Level 2 Pg.4					
10:30 - 11:00	. , ,					
	Room S221	Room S222	Room S223	Level 2 Foyer		
11.00.10.00	Decision Analysis & Methods (1) Pg.13	Operations Research (1) Pg.14	Supply Chain Management (1) Pg.15			
11:00 - 12:30 (9 parallel	Room S224	Room S225	Room S226			
sessions)	Quality Control & Management (1) Pg.16	Production Planning & Control (1) Pg.17	Manufacturing Systems (1) Pg.18	Poster Session 1		
	Room S227 Technology and Knowledge Management (1) Pg. 19	Room S228 Reliability and Maintenance Engineering (1) Pg.20	Room S229 Intelligent Systems (1) Pg.21			
12:30 - 13:30	Lunch, S421, S423, S424					
	Room S221	Room S222	Room S223	Level 2 Foyer		
	Decision Analysis & Methods (2) Pg.13	Operations Research (2) Pg.14	Supply Chain Management (2) Pg.15			
	Room S224	Room S225	Room S226			
13:30 - 15:00 (9 parallel	Quality Control & Management (2) Pg.16	Production Planning & Control (2) Pg.17	Manufacturing Systems (2) Pg.18	Poster Session 1		
sessions)	Room S227	Room S228	Room S229			
	Technology and Knowledge Management (2) Pg.19	Reliability and Maintenance Engineering (2) Pg.20	Intelligent Systems (2) Pg.21			
15:00 - 15:30	Coffee / Tea Break, Foye	er, Level 2				
15:30 - 17:30 (9 parallel sessions)	Room S221	Room S222	Room S223	Level 2 Foyer		
	Decision Analysis & Methods (3) Pg.13	Operations Research (3) Pg.14	Supply Chain Management (3) Pg.15	,		
	Room S224	Room S225	Room S226			
	Engineering Economy and Cost Analysis Pg.16	Poduction Planning & Control (3) Pg.17	Manufacturing Systems (3) Pg.18	Poster Session 1		
	Room S227	Room S228	Room S229			
	Technology and Knowledge Management (3) Pg.19	Project Management (1) Pg.20	Safety, Security and Risk Management (1) Pg.21			
18:00 - 22:00	Conference Banquet at Jumbo Floating Restaurant (Please meet at Harbour Road Entrance, Ground Floor at 17:45 and present your ticket to board bus. Refer to Pg.10 for pick-up point.)					

PROGRAM OVERVIEW

Time		Wednesday - 12 De	ecember, 2012			
08:00 - 08:50	Registration, Level 2 Lev	vel 2 Foyer (Re-opens at 10				
09:00 - 09:40	Keynote Presentation, S221 Level 2 "Triumphs of Innovation and Technologies in Hong Kong" Raymond Leung, Chairman & CEO, TDK China Co. Ltd, Hong Kong Pg.5					
09:40 – 10:30	Keynote Presentation, S221 Level 2 "A Robust Machine Learning Technique for Certain Cyber Security Problems" Daniel Yeung, Senior Past President of the IEEE SMC Society; Distinguished Professor, South China University of Technology, China Pg.6					
10:30 - 11:00	Coffee / Tea Break, Lev	el 2 Foyer				
	Room S221 Decision Analysis & Methods (4) Pg.24	Room S222 Operations Research (4) Pg.25	Room S223 Supply Chain Management (4) Pg.26	Level 2 Foyer		
	Room S224	Room S225	Room S226			
11:00 – 12:30 (9 parallel	Quality Control & Management (3) Pg.27	Prodcution Planning & Control (4) Pg.28	Service Innovation and Management (1) Pg.29	Poster Session 2		
sessions)	Room S227	Room S228	Room S229			
	Technology and Knowledge Management (4) Pg.30	Reliability and Maintenance Engineering (3) Pg.31	Global Manufacturing and Management (1) Pg.32			
12:30 - 13:30	Lunch, S421, S423, S424	& S426 to S428 Level 4				
	Room S221	Room S222	Room S223	Level 2 Foyer		
	Human Factors (1) Pg.24	Operations Research (5) Pg.25	Supply Chain Management (5) Pg.26			
	Room S224	Room S225	Room S226			
13:30 - 15:00 (9 parallel	Information Processing and Engineering (1) Pg.27	Systems Modeling and Simulation (1) Pg.28	Service Innovation and Management (2) Pg.29	Poster Session 2		
sessions)	Room S227	Room S228	Room S229			
	Technology and Knowledge Management (5) Pg.30	E-Business and E-Commerce Pg.31	Global Manufacturing and Management (2) Pg.32			
15:00 - 15:30	Coffee / Tea Break, Foyer, Level 2					
	Room S221	Room S222	Room S223	Level 2 Foyer		
	Human Factors (2) Pg.24	Engineering Education and Training Pg.25	Supply Chain Management (6) Pg.26			
	Room S224	Room S225	Room S226			
15:30 - 17:30 (9 parallel	Information Processing and Engineering (2) Pg.27	Systems Modeling and Simulation (2) Pg.28	Service Innovation and Management (3) Pg.29	Poster Session 2		
sessions)	Room S227	Room S228	Room S229			
	Facilities Planning and Management Pg.30	Project Management (2) Pg.31	Safety, Security and Risk Management (2) Pg.32			
Time		Thursday - 13 Dece				
09:00 - 16:30	Post-Conference Tour – Full-Day Hong Kong City Tour (Tour departs at 09:00 sharp. Please meet at the Harbour Road Entrance, Ground Floor at 08:45 and present ticket to board bus Refer to Pg.10 for pick-up point.)					
09:45 – 11:30	Post-Conference Tour – HK Ports Terminal Tour. (Tour departs at 09:45 sharp. Please meet at the Harbour Road Entrance, Ground Floor at 09:30 and present ticket to board bus. Refer to Pg.10 for pick-up point.)					

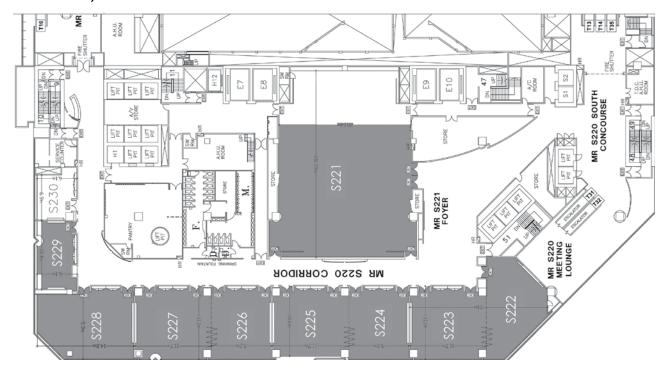
CONFERENCE TOURS PICK-UP POINT HARBOUR ROAD ENTRANCE, GROUND FLOOR



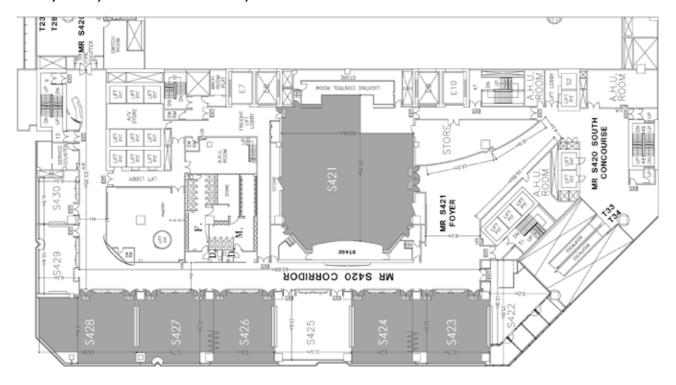
SESSION SCHEDULES

FLOOR PLAN

Meeting Rooms S221-S229, Level 2



Luncheon Rooms S421, S423, S424 & S426-S428, Level 4



Decision Analysis & Methods (1)

Tue, 11 Dec 11:00 - 12:30 Room: S221

Chairs: Kuo-Ping Lin

Wasawat Nakkiew

Abstracts: see page 35

Performance Management in the Elementary and Secondary Schools' Information Unit in Taiwan: Using the Balanced Scorecard and the Fuzzy **Analytic Hierarchy Process**

Yi-Hui Liang¹ ¹I-SHOU University, Taiwan

An Analysis Framework for **Urban Construction** Decision-making Based on **Symbiosis**

Chunying Huang¹, Xiaoming Wang²
¹Huazhong University of Science and
Technology, China Three Gorges University,

²Huazhong University of Science and Technology, China

Establishing A New Preliminary Evaluation Criteria System Model for Green Restaurants

Ching-Yu Lien¹, Bor Min Tsai¹, Hsin-Yen

¹Minghsin University of Science and Technology, Taiwan

A Multi-Criteria Decision Support Model for TV Series Selection

Cigdem Kadaifci¹, Ilker Topcu¹, Umut

¹Istanbul Technical University, Turkey

A Matching Procedure for **Goal-oriented Productivity** Improvements

Thomas Czumanski¹, Jonina Jonsson², Hermann Lodding¹

1Hamburg University of Technology,

²Beiersdorf AG, Germany

Ranking of Problematic Equipment using Six Big Losses and Analytic Hierarchy Process

Ratapol Wudhikarn¹ ¹Chiang Mai University, Thailand

A Real Options Analysis with CVA on Optimal Decision of Regulatory Capital for the Basel Capital Accord III Tyrone T. Lin¹, H. J. Chen¹ ¹National Dong Hwa University, Taiwan

Decision Analysis & Methods (2)

Tue, 11 Dec 13:30 - 15:00 Room: S221

Chairs: Imad Alsyouf Yi-Hui Liang

Abstracts: see page 36

A Methodology for Product Line Design with Consideration of Supplier Selection

S.F. Deng¹, C.K. Kwong¹, Xinggang Luo², H.M. Jiang¹ ¹The Hong Kong Polytechnic University,

²Northeastern University, China

Does Delighting Customers to Inspire Loyalty Moderated by Lodging Motivation?- A Case Study on Five-Star Hotels in Mid-Taiwan

Yung-Hsin Chen¹, Xia Wang², Shuo-Chang Tsai³, Ingrid Teng³ ¹National Cheng Kung University, Taiwan ²Renmin University of China, China ³Asia University, Taiwan

Objective Product Family Design Analysis Using Self-Organization Map

Ningrong Lei¹, Seung Ki Moon¹
¹Nanyang Technological University,

Evaluations on and Suggestions for the Sustainable Development of Shaanxi

Shuyan Gong¹, Weili Xia¹¹Northwestern Polytechnical University,

The Combination of Lean Thinking and Systems Thinking in the Design of

Manufacturing Systems
Pascal Hofmann¹, Daryl Powell¹ ¹Norwegian University of Science and Technology, Norway

Portfolio Decision Analysis in Vague Domains

Tobias Fasth¹, Aron Larsson² Stockholm University, Sweden ²Mid Sweden University, Stockholm University, Sweden

A Decision-making Model on Concession Period of Public Rental Housing BOT Project

Jingjing Zhu¹, Guangmou Wu¹Southeast University, China

Decision Analysis & Methods (3)

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Business Feasibility Methodology for Introducing New Developed Local Food Product

Wasawat Nakkiew1, Jaruwan Wannagoat¹, Wassanai Wattanutchariya¹, Anirut Chaijaruwanich1 ¹Chiang Mai University, Thailand

An Investigation of Robust

Optimal Design Using Artificial Neural Network and Genetic Algorithm

Kiatkajohn Worapradya¹, Purit Thanakijkasem¹ ¹King Mongkut's University of Technology Thonburi, Thailand

Design and Implementation of a Lean Six Sigma Framework for Process Improvement: a Case Study

Tarak Shahada¹, Imad Alsyouf¹ ¹University of Sharjah, United Arab

In-Service Inspection of Static Mechanical Equipment on Offshore Oil and Gas **Production Plants: A Decision** Support Framework

A.M.N.D.B. Seneviratne¹, R.M. Chandima Ratnayake1 ¹University of Stavanger, Norway

Customer-Driven Conceptual Design for Mid-sized Passenger Aircraft

S.Y. Han¹, Hae-Jin Choi¹ ¹Chung-Ang University, South Korea

Hybrid Fuzzy AHP-GA Approach to Supplier Selection and Order Allocation in SMEs Manufacturing Networks Nan Li¹, Guiovanni Jules¹, Mozafar

¹University of Birmingham, United Kingdom

Evaluation Model For the Sustainable Use of Information Technology

Patricia Martins¹, Antonio Grilo¹ ¹Faculdade de Ciências e Tecnologia da Universidade Nova de Lisboa, Portugal

Operations Research (1)

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A Study on Adaptive Particle Swarm Optimization (APSO) for Solving Bi-level Job-shop Scheduling Problem

Chompoonoot Kasemset¹
¹Chiang Mai University, Thailand

Optimization of the Annual Planning of Targeted Offers in Direct Marketing

Fabrice Talla Nobibon¹, Stephanie Delanote1, Roel Leus1 ¹KU Leuven, Belgium

An Algorithm for the Sugar **Cane Loading Station Location** Problem

Wirekha Khamjan¹, Supachai Pathumnakul¹, Kullapapruk Piewthongngam¹ ¹Khon Kaen University, Thailand

A Variable Neighborhood Search Approach for Multiple Resources Constrained Parallel Machine Scheduling Problem

Zhengliang Hou¹, Xiuping Guo¹, Xiuli

¹Southwest Jiaotong University, China ²Xihua University, China

A Mixed Integer Programming Formulation for Single Batch **Processing Machine with**

Incompatible Job Families
Mohamed K. Omar¹, Yasothei Suppiah²
¹Nottingham University Business School,

²Multimedia University, Malaysia

Generating and Ordering of Transport Alternatives in Inter-Modal Logistics in the Presence of Cost, Time, and **Emission Conflicts**

Maria Kalinina¹, Aron Larsson², Leif Olsson³

¹Stockholm University, Sweden ²Mid Sweden University, Stockholm University, Sweden

³Mid Sweden University, Sweden

An Optimization Model for Removal of Zinc from **Industrial Wastewater**

Farah Assadian¹, Pari Beirami¹ ¹Islamic Azad University, Iran

Operations Research (2)

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Mingzhou Jin

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Improving Business Process Performance Without Increasing Cost Shin-Guang Chen¹

¹Tungnan University, Taiwan

Clustering and Hub Selection for a Large Scale Delivery Problem[®]

Suyan Teng¹, Edmund Chan¹, Gabriel Siow²

¹Republic Polytechnic, Singapore ²ST Logistics Pte. Ltd., Singapore

A Local-Search Based Algorithm for the Escherization Problem

Shinji Imahori¹, Shohei Sakai¹ ¹Nagoya University, Japan

Minimizing Total Tardiness in NFSSP with SDSTs and RDs by Using Hybrid Differential **Evolution Algorithm**

Bin Qian¹, Zuocheng Li¹, Rong Hu¹, Xiaohong Zhu¹ ¹Kunming University of Science and Technology, China

Sequential Testing Policies for Complex Systems Under Precedence Constraints

Roel Leus¹, Wenchao Wei¹, Kris Coolen¹ ¹KU Leuven, Belgium</sup>

Incorporating Local Search in Heuristics for Dynamic and Stochastic Maritime Pick-up and Delivery Problems

Gregorio Tirado¹, Lars Magnus Hvattum²

¹Universidad Complutense de Madrid,

Spain ²Norwegian University of Science and Technology, Norway

A Markov Decision-Making Model for Emergency Medical Resource Allocation with **Multi-Category Injuries**

Hongyun Xia¹, Yiping Jiang¹, Lindu Zhao¹, Micheal Herty² ¹Southeast University, China ²RWTH Aachen University, Germany

Operations Research (3)

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Solving Euclidean Minimal Spanning Tree Problem Using a New Meta-heuristic Approach: Imperialist Competitive Algorithm (ICA)

S.Mohsen Hosseini¹, Abdullah Khaled¹,

Mingzhou Jin² ¹Mississippi State University, United States ²The University of Tennessee, United States

A New Construction Heuristic Algorithm for the Rectilinear **Block Packing Problem: A** Bridge between the Best-Fit and Bottom-Left Algorithms
Yannan Hu¹, Hideki Hashimoto¹, Shinji Imahori¹, Mutsunori Yagiura¹

¹Nagoya University, Japan

Vehicle Refueling Planning for Point-to-Point Delivery by **Motor Carriers**

Shieu-Hong Lin¹
¹Biola University, United States

Reformulation of Lawler's Algorithm by Auxiliary-information Dynamic Programming in a Minimax-cost Scheduling **Problem**

Eiji Mizutani¹ ¹National Taiwan University of Science and Technology, Taiwan

An Optimization Approach of Product Design with Consumer Preference Uncertainty

Jing Du¹, Xiaoming Hu¹, Qiang Lu¹, Suxiu Xu² ¹Harbin Institute of Technology Shenzhen Graduate School, Ćhina

²The University of Hong Kong, China

A Hybrid Algorithm for the Pickup and Delivery Problem with Time Windows: A Case Study at a Fresh Milk Plant

Mengjuan Xu¹, Lindu Zhao¹ Southeast University, China

Enhanced Group Genetic Algorithm for the Heterogeneous Fixed Fleet

Vehicle Routing Problem
Michael Mutingi¹, Charles Mbohwa²
¹University of Botswana, Botswana
²University of Johannesburg, South Africa

Inventory Systems with Power Demand, Deterioration and

Backlogged Shortages Joaquin Sicilia-Rodriguez¹, Manuel Gonzalez-De la Rosa¹, Jaime Febles-Acosta1 ¹University of La Laguna, Spain

Supply Chain Management (1)

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Horst Tempelmeier

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Identify Critical Success Factor of Knowledge Management in Supply Chain: Fuzzy DEMATEL Approach Sachin Patil¹, R. Kant¹ ¹Sardar Vallabhbhai National Institute of

Technology, India

A Predictive Model For Supply Chain Management Implementation Using AHP Methodology Shrikant Gorane¹, R. Kant¹

¹Sardar Vallabhbhai National Institute of Technology, India

Predicting the Success Possibility of Implementing Information Sharing in Supply Chain Using Consistent Fuzzy Preference Relationship

R. Kant¹, Akshay Pujara¹ ¹Sardar Vallabhbhai National Institute of Technology, India

Myopic Multi-Period Mean-Variance Inventory Policy for Fashion Products

Tsan-Ming Choi¹

¹The Hong Kong Polytechnic University, Hong Kong

Managing Health Care Perishable Apparel Products using Quick Response Program

Hau Ling Chan¹, Tsan-Ming Choi¹, Chi Leung Hui¹, Sau Fun Ng¹ ¹The Hong Kong Polytechnic University, Hong Kong

Application of the Supply Chain Concept for Educational Services

Chiu Liang Gan¹, Ek Peng Chew¹, Loo ¹National University of Singapore, Singapore

A Reverse Logistics Decision Model in Green Manufacturing

Supply Chains Tyrone T. Lin¹, Y.S. Lu¹ ¹National Dong Hwa University, Taiwan

Supply Chain Management (2)

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Supachart Iamratanakul

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A Thinking Framework for Managing Complexity in the Supply Chain Seyda SerdarAsan¹

¹Istanbul Technical University, Turkey

Capacitated Multi-Item Dynamic Lotsizing with Random Demand

Horst Tempelmeier¹
¹University of Cologne, Germany

Developing a Genetic Algorithm to Optimise an International Supply Chain under (s, S) policy

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

Micro-organizational Supply Chain Management Influential Factors: A Case Study

Nayanapriya Gunawardhana¹, Takao Enkawa¹, Sadami Suzuki¹ ¹Tokyo Institute of Technology, Japan

Quantifying Supply Chain Disruption Risk Using VaR Allan Nengsheng Zhang¹, S.M. Wagner², Mark Goh³, M. Terhorst⁴, B.

¹Singapore Institute of Manufacturing Technology, Singapore

²Swiss Federal Institute of Technology, Switzerland

³TLI-AP, National University of Singapore,

⁴RWTH Aachen University, Germany

Incentive Contracts between Fourth-party and Third-party Logistics Providers based on Performance Measurement with Intellectual Capital

Qin Zhu¹, Richard Y. K. Fung¹ ¹City University of Hong Kong, Hong Kong

Supply Chain Management (3)

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Container Pre-marshalling Problem: A Review and Solution Framework

Mohamed Gheith¹, Amr Eltawil¹, Nermine Harraz¹ ¹Egypt - Japan University of Science and Technology, Egypt

Multi-Depot Vehicle Routing Problem with Time Windows Using Hybrid Metaheuristic Algorithm

Seyed Farid Ghannadpour¹, Amin Jamili¹ ¹MAPNA Co., Iran

A Three Echelons Supply Chain Network Design in a Fuzzy Environment Considering Inequality Constraints Mahdi Bashiri¹, Mahtab Sherafati ¹

¹Shahed University, Iran

The Study of Tiered Pricing Model in Three-echelon **Reverse Supply Chain**

Fuwen Li¹, Ruizhu Han¹
¹Southeast University, China

Coordinating a Supply Chain for a Newsvendor-Type Product with Sales Effort Effects

Yao Yu Wang¹, Jian-Cai Wang² ¹Soochow University, China ²Beijing Institute of Technology, China

Strategic Design of the Construction Supply Chain: A Case of Building Projects in

Mohammad Reza Safaian¹, Hossein ¹Building Engineering Organization, Iran

Matching of Intermodal Freight Transports Using Optimization in a Decision Support System

Leif Olsson¹, Aron Larsson²

¹Mid Sweden University, Sweden ²Mid Sweden University, Stockholm University, Sweden

A Classification and Review of Recent Models for Solving the Vehicle Routing Problem and a Proposed New Problem Framework

Alyaa Abdel-Halim¹, Amr Eltawil¹ ¹Egypt - Japan University of Science and Technology, Egypt

Quality Control & Management (1)

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Sandeep Grover

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Critical Success Factors for Six Sigma Deployment: Is a Centralized Deployment Structure Better Than a Re-integrated Deployment Structure?

Alan Keeley¹, Corro Van Waveren¹, Kai-Ying Chan¹ ¹University of Pretoria, South Africa

A Method for Product Quality Management Throughout Its Life Cycle

Dinh Son Nguyen¹ ¹Danang University of Technology, The University of Danang, Viet Nam

A Generalized Linear Test Model to Monitor AR(1) **Autocorrelated Polynomial Profiles**

M. Keramatpour¹, S.T.A. Niaki², Amirhossein Amiri³ ¹Islamic Azad University, Qazvin Branch, Iran ²Sharif University of Technology, Iran ³Shahed University, Iran

Identifying the Time of a Step Change in the Mean of a Two-Stage Process

Amirhossein Amiri¹, S. Zolfaghari¹, Ali Asgari¹ ¹Shahed University, Iran

An Empirical Study of Critical Success Factors for Statistical **Process Control** Implementation: A Second-Order Factor Analysis

Jafri Mohd Rohani¹, Sha'ri Mohd Yusof¹, Ismail Mohamad¹

¹Universiti Teknologi Malaysia, Malaysia

Product Driven Quality Control

Samuel Bassetto¹, Adeline Motte¹ ¹Polytechnique Montreal, Canada

Quality Management for Leadership

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

Quality Control & Management (2)

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Nonparametric Design of Phase I X Control Charts with or without Sensitizing Run Rules

Giovanna Capizzi¹, Guido Masarotto¹ ¹University of Padua, Italy

DMAIC Methodology for Fold Defect Reduction in the Optical **Blank Industry**

Mohamed K. Omar¹, Hock Kheng Sim², Geok Ching Lim² ¹Nottingham University Business School, Malausia

²Multimedia University, Malaysia

Evaluating Intensity of Human Factors in TQM Using Analytical Network Process

(ANP) Approach Sandeep Grover¹
¹YMCA University of Science & Technology, India

Field Data Analysis in Truck Production - a Case Study Ralph Riedel¹, Egon Mueller¹ ¹Chemnitz University of Technology,

Germany

Barriers in Total Productive Maintenance Implementation in a Semiconductor Manufacturing Firm: A Case Study

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

On Detection of Spatiotemporal

Clustering Chen-ju Lin¹, Yen-ting Chen¹ ¹Yuan Ze University, Taiwan

The Role of Leadership Competencies for Implementing ISO 9000

Kem Ramdass¹
¹University of Johannesburg, South Africa

Engineering Economy and Cost Analysis

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Application of Robust Design Technique in SME Project Finance: A Case Study to Calculate Optimum Set-Points R.M. Chandima Ratnayake¹, Harsha

Jayatilaka² ¹University of Stavanger, Norway

²Kempe Engineering Services (Australia)
Pty Ltd, Australia

Strategic Fit in Value Added Networks of Electric Vehicle Production

Achim Kampker¹, Peter Burggraf¹, Carsten Nee¹ ¹University of Aachen, Germany

Demand Response Mechanism and Simulation Research of Cold Storage Air Conditioner Supporting Consumption of the Onshore Wind Power

Yu Cheng¹, Su An¹
¹North China Electric Power University, China

Managing the Economic Performance of Research-driven Initiatives in the Field of Transdisciplinary Research

Florian G. H. Behncke¹, Martina Wickel¹, Udo Lindemann¹ ¹Technische Universitat Munchen,

The Optimal Allocation of the Investment Capital for R&D Projects at the Commercial Stage with the Kelly Criterion

Gyutai Kim¹ ¹Chosun University, South Korea

Research on Life Cycle Management of Nuclear Power Plant equipment based on **Economic Analysis**

Kai-kai Gu¹, Jiang Guo¹, Ming-shu Fan¹, Ke-fei Zhang¹, Lei Shi¹ ¹Wuhan University, China

Injection Mold Replacement **Analysis in Automotive** Industry

Tanasak Šuwannabool¹, Daricha ¹Chulalongkorn University, Thailand

Service Provision, Subsidies and Revenue Maximization in **Multitier Communities**

Hailing Zhu¹, Mbuyu Sumbwanyambe¹, Andre L Nel¹ ¹University of Johannesburg, South Africa

Production Planning & Control (1)

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Constructing Generic Processes based on Tree Unification for **Process Family Planning**

Linda Zhang¹¹¹IESEG School of Management, France

Batch Optimization Algorithm for Autoclave Curing of **Fiber-Reinforced Composites**

Tobias Philipp¹, Thorsten Klein¹, Gunther Reinhart¹ ¹Technische Universitaet Muenchen, Germany

Approach for an RFID-based Situational Shop Floor Control

Philipp Engelhardt¹, Gunther Reinhart¹ ¹Technische Universität München,

21st Century Operational Excellence: Addressing the Similarities and Differences between Lean Production, Agility and QRM

Daryl Powell¹, Jan Ola Strandhagen¹ ¹Norwegian University of Science and Technology, Norway

Operations Scheduling in Make-and-Pack Production: Schedule Construction and **GA-based Priority-Rule Generation Procedures**

Philipp Baumann¹, Norbert Trautmann¹ ¹University of Bern, Switzerland

Modeling the Master **Production Scheduling System** with Downgraded Products for a TFT-LCD Module Factory

Chun-Cheng Lin¹, Jia-Rong Kang¹, Wan-Yu Liu², Shu-Hsing Chung¹, Kai-Shin Chou¹
¹National Chiao Tung University, Taiwan ²Aletheia University, Taiwan

Production Planning & Control (2)

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Chang Liu

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New Entropy Weight-Based TOPSIS for Evaluation of Multi-objective Job-Shop **Scheduling Solutions**

Junqiang Wang¹, Jian Chen¹, Ting Qu², George Huang², Yingfeng Zhang¹ Shudong Sun¹
¹Northwestern Polytechnical University,

²The University of Hong Kong, Hong Kong

An Artificial Immune Based Algorithm for Parallel-machine Scheduling with Preference of Machines

Ching-Jen Huang¹, Li-Man Liao¹ ¹National Chin-Yi University of Technology,

A Multi-Agent Based Rescheduling Framework for Mixed-Model Assembly Line Balancing

Li-Man Liao¹, Ching-Jen Huang¹
¹National Chin-Yi University of Technology,

A Finite Economic Production Quantity Model with Two Imperfect Modules

Dah-Chuan Gong¹, Gary C. Lin², Kai-Xun Zhuang³, Pei-Han Lee³ ¹Chung Yuan Christian University, Taiwan, National University of Singapore, Singapore

²Bradley University, United States ³Chung Yuan Christian University, Taiwan

The Significance of Serendipity

in New Market Creation Akihiko Nagai¹, Takayuki Ito¹ ¹Nagoya Institute of Technology, Japan

Combined Economic and **Emission Dispatch Using** Harmony Search and Genetic Algorithm

Yun-Chia Liang¹, Josue Cuevas ¹Yuan Ze University, Taiwan

Production Planning & Control (3)

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Research on Dynamic Dispatching Rule for Semiconductor Assembly **Production Line**

Chang Liu1, Hai-Zan Chen2, Yuan Rong³, Jun Zhu²
Wuxi CAS Ubiquitous Information
Technology R&D center Co.Ltd,Shenyang
Institute of Automation, China ²Chinese Academy of Sciences, China ³Massachusetts Institute of Technology, **United States**

A Data Envelopment Analysis Approach to Resource Efficiency Evaluation

Jenny Xu¹, Siddharth Goutam¹, Xun Xu¹, Shane Xie¹ ¹University of Auckland, New Zealand

Simulation Aided Disturbance Management in One-of-a-kind Production on the Assembly

Robert Wandt¹, Axel Friedewald¹, Hermann Lödding¹ ¹Hamburg University of Technology, Germany

Solving the Problem of **Product-Conversion in** Semiconductor Assembly and Test Manufacturing System by a Novel Heuristic Scheduling Algorithm

Li-li Yao1, Hai-bo Shi2, Chang Liu2 'Graduate University of the Chinese
Academy of Sciences, Shenyang Institute of
Automation, CAS, China

'Wuxi CAS Ubiquitous Information
Technology R&D center Co.Ltd, Shenyang Institute of Automation, China

Deterministic Joint Replenishment Problem with Multiple Restriction: A Lagrangian Relaxation Approach

Amit Kumar Gupta¹, R R K Sharma¹ ¹Indian Institute of Technology Kanpur,

Optimization of Manufacturing Planning and Control Systems in Highly Dynamic **Environments using Bernoulli** Theorem

Johannes Mapokgole¹, Tengen Thomas¹ ¹Vaal University of Technology, South

A Multi-Crop Production Planning Model for **Hydroponic Systems With** Nutrient Mix Reusability

Haniel Chua¹, Francis Ramirez¹, Kyle Sy¹, Dennis Cruz¹ ¹De La Salle University, Philippines

Bi-objective Simulated Annealing and Adaptive Memory Procedure Approaches to Solve a Hybrid Flow Shop Scheduling Problem with Unrelated Parallel Machines Hmid Mohammadi¹, Rashed Sahraeian¹ ¹Shahed University, Iran

Manufacturing Systems (1)

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A Multi-objective Biogeography-based Optimization for Mixed-model Two-sided Assembly Line Balancing with a Learning **Effect**

Ronnachai Sirovetnukul¹, Uamporn Jansame², Parames Chutima²¹¹Mahidol University, Thailand²²Chulalongkorn University, Thailand

The Study Wood Furniture Which Made of Fast Growing Wood Specie of Azadirachta exceisa (Jack) Jacobs. for Wood Industrial Standard by Finite **Element and Design Analysis** of Experiments

Sakkarin Choodoung¹, Chalermpon

¹King Mongkut's University of Technology North Bangkok, Thailand

Analysis of Assembly Sequence for Effective Assembly Plan of **Wooden Furniture**

Sakkarin Choodoung1, Uttapol Smutkupt²

¹King Mongkut's University of Technology North Bangkok, Thailand ²Chiang Mai University, Thailand

Robustness of Assemble-to-Order Systems against Unexpected Events Henri Tokola¹, Esko Niemi¹

¹Aalto University, Finland

The Role of Total Productive Maintenance in Manufacturing Firms: A Review

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

Critical Success Factors for MES Implementation in China

Huasheng Yang¹, Li Zheng¹, Yi Huang¹
¹Tsinghua University, China

How Dose Product Innovation Help New Firm Growth: The Moderating Effects of Knowledge from Demand Side and Business Environment

Chaoqun Zhang¹, Xiaobo Wu¹ ¹Zhejiang University, China

Manufacturing Systems (2)

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Reconfigurable Mixed Model Assembly Line Design in a Dynamic Production Environment

Dida Damayanti¹, Isa Setiasyah Toha² ¹Telkom Institute of Technology, Indonesia ²Bandung Institute of Technology, Indonesia

Deconstructing Emerging Business Ecosystems: **Explorations of the Chinese** Electric Vehicle Industry

Tianjiao Shang¹, Yongjiang Shi ¹University of Cambridge, United Kingdom

A New Decision Making Approach for the Formation of Holonic Agent-based Manufacturing Networks Guiovanni Jules¹, Mozafar Saadat¹, Nan

¹University of Birmingham, United

The Hybrid Manufacturing Cell: Determining Key Parameters in the Integration of Powder Bed Fusion with High

Speed Milling
Vegard Brotan¹, Klas Magnus Bovie²
¹Norwegian University of Science and
Technology , Norway
²SINTEF Raufoss Manufacturing AS, Norway

Linking Strategic Goals with Operational Performance: An Integrated Approach

Antonio Almeida¹, Daniel Politze², Alvaro Caldas¹, Americo Azevedo¹ ¹INESC TEC, Faculdade de Engenharia da Universidade do Porto, Portugal ²ETH Zurich, Switzerland

Performance Modeling of Reconfigurable Manufacturing System for Different Dispatching Strategies Under Exception

Faisal Hasan¹, P.K Jain¹, Dinesh Kumar¹ ¹Indian Institute of Technology Roorkee,

Reactive Scheduling for Non-disruptive Job Processing

Against Machine Breakdowns
Wan-Ling Li¹, Muhammed Hafidz
Fazli¹, Tomohiro Murata¹
¹Waseda University, Japan

Manufacturing Systems (3)

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The Robust Scheduling Solutions for Parallel Machine Systems Under an Uncertain Environment

Xuanhao Zhou¹, Yong-Zai Lu¹ ¹Zhejiang University, China

Study on the Layered Predictive Control Algorithm for the Main Steam Temperature of Ultra-supercritical Units

Shihe Chen¹, Wenkai Hu², Xin Li²
¹Guangdong Electric Power Research Institute, China ²Wuhan University, China

Optimization of Power Station Boiler Coal Mill Output Based on the Particle Swarm Algorithm

Yanjun Fang¹, Xiaojie Qin¹, Yuan Fang¹ ¹Wuhan University, China

Lean Manufacturing in Textile Industry of Pakistan

Ali Husnain Rabbani¹, Muhammad Asim² Asim'National University of Sciences and Technology, Pakistan
'Center For Advanced Studies In Engineering, Pakistan

Scheduling a BPM with Incompatible Job-Families and **Dynamic Job-Arrivals**

Muthu Mathirajan¹, M Vimalarani¹ ¹Indian Institute of Science, India

Characteristic Simulation of **High Pressure Common Rail** Pipe

Jiping Lu¹, Fan Hongli¹, Wang Lianhong², Song Hao¹, Pan Yong¹ ¹Beijing Institute of Technology, China ²China North Engine Research Institute,

Integration of Sustainability and Mass Customization: Proposal of a Framework to Map Research Open Issues

Golboo Pourabdollahian¹, Mahnoosh Zebardast¹, Marco Taisch¹ ¹Politecnico di Milano, Italy

Deciphering Business Ecosystem Capabilities of the Emerging Electric Vehicle Industry

Tianjiao Shang¹, Feifan Chang¹, Yongjiang Shi¹ ¹University of Cambridge, United Kingdom

Technology and Knowledge Management (1)

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Effective Wi-Fi Setting User Experience Design by Using Systematic Innovation Method

Song-Kyoo Kim¹ ¹Asian Institute of Management, Philippines

Making Mergers More Effective Through Technology Management

Murali Krishna Kuppili¹, Ramachandra Aryasri² ¹SoCtronics Technologies Pvt. Ltd., India

²JNTU, India

A Study on the Job Satisfaction of Governmental Labor **Inspectors in Taiwan**

Fu-Man Hsieh¹, Yichun Yu², Y.C. Lin², P.-J. Tsai³

¹Wenzao Ursuline College of Languages, Taiwan

²Institute of Occupational Safety and Health, Taiwan

³China Medical University, Taiwan

Interpretive Structural Model of Key Performance Indicators for Sustainable Manufacturing **Evaluation in Automotive** Companies

Elita Amrina¹, Sha'ri Mohd Yusof² ¹Andalas University, Indonesia ²Universiti Teknologi Malaysia, Malaysia

How to Use the Big Data to the Technology Planning: A **Data-Driven Technology**

Roadmapping Using ARM Youngjung Geum¹, Hyeonjeong Lee¹, Yongtae Park¹

¹Seoul National University, South Korea

E-service Concept Design in Recombinative Innovation: A Morphology Analysis Approach

Jieun Kim¹, Yongtae Park¹

¹Seoul National University, South Korea

Technology and Knowledge Management (2)

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Locating the Key Competitors: A New Tool for Technology Manager

Chung-Huei Kuan¹, Mu-Hsuan Huang², Dar-Zen Chen² ¹National Taiwan University of Science and Technology, Taiwan

²National Taiwan University, Taiwan

Leadership as a Determinant of Product Innovation: a Systematic Review of the Literature

Tharnpas Sattayaraksa¹, Sakun Boon-itt² ¹Hatyai University, Thailand ²Thammasat University, Thailand

A Knowledge Service Framework for Product-design Activities

Si Chen¹, Yan Yan¹, Wang Zhao², Wang Guoxin¹, Zhao Yijing¹ ¹Beijing Institute of Technology, China ²Center for Space Science and Applied Research, China

Capability Development - No Path, Response to Competition: The Cross-case of Google,

Ericsson, Microsoft and Nokia Mait Rungi¹, Alar Kolk² ¹Tallinn University of Technology, Estonia ²Aalto University, Finland

Analysis Individual Tacit Knowledge Toward Innovation

Augustina Asih Rumanti¹, Iwan Inrawan Wiratmadja², Trifenaus Prabu Hidavat1

¹Atma Jaya Catholic University of Indonesia, Indonesia ²Bandung Institute of Techonlogy, Indonesia

The Mediating Role of Absorptive Capacity between Financial Slack and Performance

Antonio Verdu¹, Lirios Alos-Simo¹, Jose Maria Gomez-Gras1, Maria Jose ¹University of Miguel Hernandez, Spain

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Technology and Knowledge

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Technology Evaluation Practices in Universities

Technology Transfer Offices Fernando Romero¹, Antanio Rocha¹ ¹University of Minho, Portugal

Knowledge Visualization in Product Development using Trade-Off Curves

Maksim Maksimovic1, Ahmed Al-Ashaab¹, Robert Sulowski², Essam Shehab1

¹Cranfield University, United Kingdom ²Sitech, Poland

Impact of Enterprise Strategic Flexibility on Innovation Performance: Based on Dual Perspective of Proactive and Reactive

Zhigang Fan¹, Dongmei Fan², Sun Yuan³

¹Hangzhou Normal University, China ²Zhongnan University of Economics and

³Zhejiang Gongshang University, China

Care Apparel Design Reuse System: Design and Implementation

Bibo Yang¹, Lei Ai²
¹The Hong Kong Polytechnic University,

²Donghua University, China

Patent-based Indicators for Analyzing the Wind Power Markets

Matti Karvonen¹, Rahul Kapoor¹, Tuomo Kassi1 ¹Lappeenranta University of Technology,

The Role of Funding Source for Commercializing University Patents: Network Analysis on Technology - Industry Linkage **Patterns**

Yongrae Cho¹, Sanghoon Lee¹, Wonjoon Kim

¹KAIST (Korea Advanced Institute of Science and Technology), South Korea

Knowledge Management and Learning Organization: Linking Knowledge-based System to Service Delivery Processes

Wen-Jung Chang¹, Christina Tay²

¹Delin Institute of Technology, Taiwan ²Chinese Culture University, Taiwan

A STEP-based Product Knowledge Model for One-of-a-kind Production

Bomiao Li1, Shane Xie1, Xun Xu1 ¹University of Auckland, New Zealand

Reliability and Maintenance Engineering (1)

Tue, 11 Dec 11:00 - 12:30 Room: S228

Chairs:

Roger Jiao ZhengGuo Xu

Abstracts: see page 56

Optimal Maintenance Service Contract for Equipments with Availability Target

Bermawi Iskandar¹, Hennie Husniah¹ ¹Bandung Institute of Technology, Indonesia

Specification of Change Points of Failure Rate or Intensity Function: A Non-parametric Approach

Renyan Jiang¹
¹Changsha University of Science and Technology, China

Reliability Analysis Based on Jump Diffusion Models for an **Open Source Cloud Computing**

Yoshinobu Tamura¹, Hirona Miyahara² Shigeru Yamada² ¹Yamaguchi University, Japan ²Tottori University, Japan

Quantification of Organizational Influences on Failure Rate: A Bayesian Approach

Hui Jin¹, Marvin Rausand¹, Ali Mosleh², Stein Haugen¹
¹Norwegian University of Science and Technology, Norway ²University of Maryland, United States

Failure Rate Prediction in Various Life Cycle Phases: A Framework for Updating

Maryam Rahimi¹, Marvin Rausand¹

*Norwegian University of Science and Technology, Norway

Optimal Transmission Lines Assignment in a Multi-source Multi-sink Computer Network

Yun Zhang¹, Zhengđuo Xu¹, JianGang Lu¹, YouXian Sun¹ ¹Zhejiang University, China

Simulation Evaluation of State-based Preventive Maintenance for a Machine with Multiple Quality States

Chao Qi¹, Hongwei Wang¹, Sivakumar Appa Iyer² ¹Huazhong University of Science and Technology, China ²Nanyang Technological University, Singapore

Reliability and Maintenance Engineering (2)

Tue, 11 Dec 13:30 - 15:00

Room: S228

Chairs: R. Jiang

Yoshinobu Tamura

Abstracts: see page 57

Remaining Lifetime Assessment of a Deteriorating System Operating Under Permanent Effect of Fluctuant **Environment**

Elias Khoury¹, Estelle Deloux¹, Antoine Grall¹, Christophe Berenguer² ¹Troyes University of Technology (UTT),

²Grenoble Institute of Technology, France

Thermooxidation Degradation and Life Prediction of Nitrile Butadiene Rubber Based on Kinetics Model

Kun Zhang¹, Jinyong Yao¹, Tongmin Jiang¹

¹Beijing University of Aeronautics and Astronautics, China

Probabilistic Modeling of Solder Joint Thermal Fatigue

with Bayesian Method Limei Xie¹, Ying Chen¹, Rui Kang¹ ¹Beihang University, China</sup>

Reliability-Based Structural Design: A Case Study of Car Wheels

Yitao Liu¹, Feng Zhou¹, Roger Jiao¹ ¹Georgia Institute of Technology, United

Reliability Assessment and Analysis of Incorporating Fault Tolerance into Service-oriented Architectural Systems

Kuan-Li Peng¹, Chin-Yu Huang¹ ¹National Tsinghua University, Taiwan

Blade-based Maintenance Policy of Offshore Wind Turbine with the Presence of Covariate under Random Shock

Wenjin Zhu¹, Mitra Fouladirad¹, Christophe Berenguer² ¹University of Technology of Troyes, France ²Grenoble Institute of Technology, France

Project Management (1)

Tue, 11 Dec 15:30 - 17:30 Room: S228

Chairs: Leon Pretorius Tomasz Blaszczyk

Abstracts: see page 58

An Integer-Programming Approach to Benefit-Maximal Selection and Scheduling of **Resource-Constrained Projects**

Gianluca Brandinu¹, Norbert Trautmann¹

¹University of Bern, Switzerland

An Investigation into the Relationship between Project Management Maturity and Project Performance in the **Telecommunications Industry** in Zimbabwe

Tapiwa Murambiwa¹, Marie-Louise

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

Unlocking Critical Success Factors and Criteria in Capital **Projects - A Perspective From** the South African

Petrochemical Industry Marie-Louise Barry¹, Danver Jacobs² ¹Tshwane University of Technology, South

²University of Pretoria, South Africa

Responding to an Ageing Workforce and the Implications for Engineering Management

Julien Pollack¹
¹University of Technology Sydney, Australia

Risk Crash: a New Approach to Quantify the Relationship Between Risk of Delay and **Project Duration**

Tommaso Salvagnini¹, Giorgio Locatelli2, Mauro Mancini1, Edoardo Cesa Bianchi¹ ¹Politecnico di Milano, Italy ²University of Lincoln, United Kingdom

Role Development for Interdisciplinary Collaboration Support in Biomimetics

Manuela Iulia Parvan¹, Hendrik Oepke¹, Katharina Kaiser¹, Udo Lindemann¹ ¹Technische Universitat Munchen, Germany

A New Event-based MILP Model for the **Resource-constrained Project** Scheduling Problem with Variable Intensity Activities (RCPSVP)

Alain Hait¹, Georges Baydoun¹
¹University of Toulouse, ISAE, France

Resource Constrained Project Scheduling Problem: A DÉA based Genetic Algorithm

Behzad Ashtiani¹, Fatemeh Paidar¹, Amir Masoud Hosseinmardi¹, Esmaeil Najafi Trojani¹ Science and Research Branch of Islamic Azad University, Iran

Intelligent Systems (1)

Tue, 11 Dec 11:00 - 12:30 Room: S229

Chairs: Jose Machado

. Jaekyung Yang

Abstracts: see page 59

Intelligent Systems based in **Hospital Database Malfunction** Scenarios

Paulo Silva1, Cesar Quintas2, Pedro Goncalves¹, Gabriel Pontes¹, Manuel Santos¹, Antonio Abelha¹, Jose Machado¹

¹University of Minho, Portugal ²Centro Hospitalar do Porto, Portugal

Monitoring Intelligent System for the Intensive Care Unit using RFID and Multi-Agent Systems

Rui Rodrigues¹, Pedro Goncalves¹, Luis Miguel Miranda¹, Carlos Filipe Portela¹, Manuel Santos¹, Jose Neves¹, Antonio Abelha1, Jose Machado1 ¹University of Minho, Portugal

Image Analysis for Pig Recognition Based on Size and Weight

Apirachai Wongsriworaphon¹, Supachai Pathumnakul ¹, Banchar Arnonkijpanich¹
¹Khon Kaen University, Thailand

Ontology-Based Context Model of Turret

Qiqi Yin1, Qing Xue1, Minxia Liu1, Kan

¹Beijing Institute of Technology, China

An Artificial Neural Network Approach for Estimating Suitable Ratio of Filling Fat in

Animal Feed Production Mongkon Ittiphalin¹, Supachai Pathumnakul ¹, Kullapapruk Piewthongngam¹, S. Homdee¹

¹Khon Kaen University, Thailand

Rule Extraction Using Firefly Optimization: Application to

Banking
Naveen Nekuri¹, Ravi Vadlamani¹,
Raghavendra Rao C², Sarath K.N.V.D¹
¹Institute of Development and Research in Banking Technology, India ²University of Hyderabad, India

Intelligent Systems (2)

Tue, 11 Dec 13:30 - 15:00 Room: S229

Chairs: Allan Nengsheng Zhang

Ronnachai Sirovetnukul

Abstracts: see page 60

An AI-based System for Telecommunication Network Planning

Kin Poon¹, Andrej Chu¹, Anis Ouali¹

¹Khalifa University of Science, Technology and Research, United Arab Emirates

An Efficient Approach for Updating the Structure for Mining Frequent Patterns

Show-Jane Yen¹, Yue-Shi Lee¹, Jia-Yuan

¹Ming Chuan University, Taiwan

Architecture of Knowledgeable Manufacturing System and Knowledge Representation Methods

Youlong Lv¹, Wei Qin¹, Jie Zhang¹ ¹Shanghai Jiao Tong University, China

An Intelligent System for Production Resources Planning in Hong Kong Garment

Industry
Kar Hang Carmen Lee¹, K.L. Choy¹,
Kris, M Y Law¹, G.T.S. Ho¹
The Hong Kong Polytechnic University, Hong Kong

Buyer-Supplier Predicting Offers in Supply Contract Negotiation Using Neural Network

Yusraini Muharni1, Chao Ou-yang2,

Chun Ching Lee³

National Taiwan University of Science and Technology, Taiwan, University of Sultan Ageng Tirtayasa, Indonesia ²National Taiwan University of Science and

Technology, Taiwan ³Tungnan University, Taiwan

Safety, Security and Risk Management (1)

Tue, 11 Dec 15:30 - 17:30 Room: S229

Chairs: R.M. Chandima Ratnayake

Masanori Akiyama

Abstracts: see page 61

Addressing IT Security in Practice: Key Responsibilities, Competencies and Implications on Related Bodies of Knowledge

Younes Benslimane¹, Ankit Patel¹, Bouchaib Bahli², Zijiang Yang¹¹York University, Canada ²ESC School of Business, France

Hybridization of Statistical and Cognitive Experience Feedback to Perform Risk Assessment. Application to Aircraft Deconstruction

Eric Villeneuve¹, Cedrick Beler¹, François Peres¹, Laurent Geneste¹ ¹LGP/ENIT - Université de Toulouse, France

A Study of Fire Evacuation from an Industrial Building

Using Simulex
Diana Freitas¹, Pedro Arezes¹
¹University of Minho, Portugal

Noise Risk Assessment of

Taiwan High Speed Rail Kang-Ting Tsai¹, Y. T. Huang¹, Min-Der Lin¹ ¹National Chung Hsing University, Taiwan

The Effect of Maintenance Seen From Different Perspectives on

Major Accident Risk
Peter Okoh¹, Stein Haugen¹
¹Norwegian University of Science and Technology, Norway

Study on Classification of Safety-related Organizational Factors in a Nuclear Power Plant

Dai Licao¹, Pengcheng Li¹, Huang Shudong¹, Zhao Ming¹
¹University of South China, China

Quantitative Research of Risk Relationships of Sewage Treatment Plants Based on **Concession Operation**

Hui Sun¹, Yanhong Lu¹
¹Tianjin University, China

Theoretical Research on **Crossflow Pollution in Short** Distance and Continuous Road Tunnels

Pai Xu¹, Shu-ping Jiang², Zhi Lin², Jian-zhong Chen² ¹Chongqing Jiaotong University, China ²China Merchants Chongqing Communications Research & Design Institute Co., Ltd., China

Poster Session 1

Tue, 11 Dec Level 2 Foyer

p.62 **Integration of Supply Chains** via Vertical Merger and Acquisition: Mechanism and Policy

Haiyan Yan¹, Wenbin Zhao¹, Bo Xu¹ ¹Shanghai Institute of Foreign Trade, China

p.62 **Enabling of Sustainable** Supply Chain Management with Lean Thinking - A Comparative Study of Manufacturers in Kyoto **Protocol Signatory Countries** Stuart So1, Hongyi Sun2

¹The University of Queensland, Australia ²City University of Hong Kong, Hong Kong

p.62 The Impact of Information Technology on Supply Chain Management Capabilities: A Resource-Based View

Yi- Fen Su¹ ¹Minghsing University of Science and Technology, Taiwan

A Heuristic Method based on Genetic Algorithm for Storage Location Assignment in a Pick-and-Pass Warehousing System with Multiple Pickers Po-Hsun Shih¹, Jason Chao-Hsien

Pan², Ming-Hung Wu² ¹Vanung University, Taiwan ²Takming University of Science and Technology, Taiwan

Value Stream Mapping Analysis for Improving the Harvesting and Transport Processes of Cotton

Yulin Li¹, Shuping Yi²
¹Chongqing University, Shihezi
University, China
²Chongqing University, China

Decision to Refurbished p.62 **Products Based on** Cost-benefit of Remanufacturing Model in Closed Loop Supply Chain

Yan Liang¹, Joseph Chen ¹Bradley University, United States

Effects of Information p.62 Transparency on Supply Chain Quality Management Jing Hua Xiao¹, Zhao Lin Cheng¹, Cai Wen Zhang¹, Kang Xie¹ ¹Sun Yat-Sen University, China

Towards Better Supply Chain p.62 Visibility - the Design and Implementation of a Supply Chain System S-ConTrol to Support an Operational HQ

in Singapore
Wen Jing Yan¹, Puay Siew Tan¹, Niak
Wu Koh¹, Tan Yong Qiang¹, Allan
Nengsheng Zhang¹
¹Singapore Institute of Manufacturing Technology, Singapore

Hybrid Ant Colony Optimization for Library Distribution Network

Weidong Lin¹, E.S. Chan¹, S.Y. Chia¹, ¹Temasek Polytechnic, Singapore

p.63 **Using Decision Analysis** Method to Evaluate the **Cost-effectiveness of Similar** effect Medical Materials in Hospital

Nai-Chuan Fang¹, Ming-Jong Yao², Tsueng-Yao Tseng³
¹Taichung Veterans General Hospital, Taiwan ²National Chiao Tung University, Taiwan ³Tung Hai University, Taiwan

2-tuple Linguistic Prioritized Harmonic Applied to Group p.63 **Decision Making**

Jin Han Park¹, Jong Jin Seo¹, Young Chel Kwun² ¹Pukyong National University, South ²Dong-A University, South Korea

The Associations between p.63 Professional Commitment, Learning Burnout, and Grade Point Average in Independent College Students

Aiqun Yu¹, Ji-Wei Ma², Yi-Wen Chen²
¹Key Laboratory of Behavioral Science,
Institute of Psychology, Chinese
Academy of Sciences ;Canvard College, Beijing Technology and Business University, China ²Institute of Psychology, Chinese Academy of Sciences, China

AHP in Prioritizing Vibration Parameters for Maintenance of Machine Tools

Manjunath Gowda¹, H. N. Suresh¹, K. M. Basappaji¹

¹Jawaharlal Nehru National College of Engineering, India

Mathematical Programming p.63 Model for Type-I Two-sided Assembly Line Balancing Problem

Hsiu-Hsueh Kao1, Din-Horng Yeh2, Sih-Ting Huang² ¹Tamkang University, Taiwan ²National Chung Cheng University,

The Design of an AGV in the Manufacturing Cell p.63

Suksan Prombanpong¹, W Kiattiphatthananukul¹, A Songsanan¹, Assariya Sukin¹ ¹King Mongkut's University of Technology Thonburi, Thailand

The Improvement in the Reliability Problem for Air Current Breaker's Over p.63 **Current Protect Function**

Cheng-Chung Chien¹, C.N. Chang¹, Yung-Tang Wu¹, C. C. Tseng¹, D.H. Chiu ¹, J.K. Wan¹, C.S. Wu¹, C.T. Hsu¹, E.D. Chen¹, F.H. Li¹, T.H. Shao¹ ¹Tainwan Semiconductor Manufacturing Company, Taiwan

A Study of Software Reliability Growth Model for p.63 **Time-dependent Learning Effects**

Kuei-Chen Chiu1 ¹Hsing Kuo University of Management, Research on Machining Process Reliability in Multi-procedure Machining Processes

Ping Jiang¹, Yunyan Xing¹, Yajie Liu¹, Bo Guo¹, Gan Lin² ¹National University of Defense Technology, China ²EAAF, China

Vibrations of Timoshenko p.64Beams with Damping and **Forcing Terms**

Norio Yoshida¹ ¹University of Toyama, Japan

A Performance Comparison Between the Base Stock (BS), **Traditional Kanban Control** System (TKCS) and Extended Kanban Control System (EKCS)

¹Nanyang Technological University, Singapore

p.64 Air Traffic Management of an Airport Using Discrete Event Simulation Method

Maurizio Bevilacqua¹, Filippo Ciarapica², Giovanni Mazzuto¹, Leonardo Postacchini² ¹Università Politecnica delle Marche, Italy ²Free University of Bolzano-Bozen, Italy

Insertion Loss Analysis of p.64 Perforated Panel Muffler **Using Finite Element Method** with Equivalent Fluid Model Jingxiang Li¹, Shengdun Zhao¹, Kunihiko Ishihara²

¹Xi'an Jiaotong University, China ²The University of Tokushima, Japan

p.64 **Personnel Selection System** Framework Research

Zhengsheng Han¹, Hongyan Dui¹, Shudong Sun¹ ¹Northwestern Polytechnical University,

From Individual Creativity to p.64 **Team Creativity**

Liqun Wen¹, Mingjian Zhou¹, Qiang ¹Harbin Institute of Technology Shenzhen Graduate School, China

Application of Affective Engineering in the Opening and Closing of Sport Utility vehicle Tailgates

Taebeum Ryu¹ ¹Hanbat National University, South Korea

The Impact Study of Transformational Leadership Style on Organizational Success

Akechai Judkrue¹ ¹Assumption University of Thailand,

p.65 The Effect of Online Service Failures on Consumer **Repurchase Intention Basing** on Mainland China Online **Retailing** Junfeng Liao¹, Linlin Zhong¹

South China University of Technology,

Exploring the Intention of Customers to Use Innovative **Digital Content Information** Technology

D.Y. Sha¹, Guo-Liang Lai²¹Chung Hua University, Taiwan²National Chiao Tung University,

p.65 New Formal Approach To

Project Critical Buffer
Tomasz Blaszczyk¹, Pawel Blaszczyk²
¹University of Economics, Poland
²University of Silesia, Poland

Investment Decisions on the p.65 Case Industrial Port BOT **Project**

Tyrone T. Lin¹, H.C. Su¹ ¹National Dong Hwa University, Taiwan

p.65 A Trimming Design Method for Product Innovation

Yao-Tsung Ko¹, Ping-Hong Kuo¹ ¹Tunghai University, Taiwan

Multi-project Planning and p.65 **Optimisation for Shipyard Operations**

Allan Nengsheng Zhang¹, B. Ma¹, D. Loke², S. Kumar², Y. Y. Chan²

¹Singapore Institute of Manufacturing Technology, Singapore

²Astoria Consulting Pte Ltd, Singapore</sup>

Research on Jiangsu PV Solar Industrial Cluster Upgrading p.65 Driven by RJVs

Lan Chen¹, Bo Wu² ¹Hehai University; Yancheng Institute of Technology, China ²Hehai University, China

Exploring the Impact of Patent Expenditures on Performance: Evidence from Chinese Stock Market

¹Chongqing University of Technology,

Leader's Values, Abusive p.65 Supervision, and Employee Performance: A Theoretical

Xiaoli Wen1, Chunhua Chen1 ¹South China University of Technology, China

Research on the KMS for Small and Medium **Manufacturing Enterprises** based on ASP and CSP

Huiyu Huang¹, Jianying Luo¹, Zhicong Zhang¹ ¹Dongguan University of Technology,

Temporal Network Analysis p.66 of Emerging Technologies: Topic Transition in World Wide Web (WWW) Conferences

Kazuma Arino¹, Takao Furukawa¹, Nobuyuki Shirakawa¹, Kumi ¹National Institute of Science and Technology Policy, Japan

Knowledge Asset-based Three-stage Model of **Innovative Enterprises Evolution**

Yunmei Wang1, Chunlin Si1, Fan Xia1, King-Lien Lee² ¹Fudan University, China ²National Taipei Üniversity of Technology, Taiwan

Modelling Ontology for Supporting Human Resource Planning Process Rohayati Ramli¹, Mohd. Noah

Shahrul Azman¹, Mohd Yusof Maryati1 ¹Universiti Kebangsaan Malaysia, Malaysia

Patent Portfolio Efficiency Using Data Envelopment Analysis: Case of Wind Power Market

Rahul Kapoor¹, Matti Karvonen¹, Tuomo Kassi¹ ¹Lappeenranta University of Technology,

p.66 **Study of Supplier Support** through New Product **Development in System** Integration Industry -Comparison of Case Studies based on Different Product Newness

Min-Sun Wuang¹, Kuei-Fei Yang¹ ¹Fu Jen Catholic University, Taiwan

Impact of Passionate and Charismatic Leadership on Creativity and Innovation within SMEs

Wilson Maladzhi¹, Bingwen Yan¹, Oluwole Daniel Makinde¹ ¹Cape Peninsula University of Technology, South Africa

Analysis of RFID Technology p.66 on Controlling Shrinkage and Anti-counterfeiting in **Luxury Industry**

Wei Xu¹, Zhaotong Lian¹, Xifan Yao² ¹University of Macau, China ²South China University of Technology,

The Service Science Practice p.67 Research: A Proof of Service Concept on i236 Project in

New Taipei City Hung Chih Lai¹, Yao Cheng Yu², Kae Kuen Hu², Hui Shan Kuo² ¹Shih Chien University, Taiwan ²National Taiwan University, Taiwan

p.67 The Evaluation of Enterprise **Manufacturing Services** Maturity Model

Hao Li¹, Yangjian Ji², Xinjian Gu², Guoning Qi² ¹Zhejiang University, Zhengzhou University of Light Industry, China ²Zhejiang University, China

p.67 Ten Steps in Mixed **Engineering Education and**

Training Hsing-yu Hou¹, Huey-shing Tsai¹ ¹University of Transworld, Taiwan

Bilingual Teaching Practices p.67 of "Quality and Reliability Engineering" Course

R. Jiang¹, T. Wang¹ ¹Changsha University of Science and Technology, China

An Empirical Study on Influencing Factors of Consumer Behavior of **Engineering Insurance**

Li Dong¹, Yan-ling Liu¹ ¹Tongji University, China

Evaluating the Reliability of Infrastructure Networks by Resilience Analysis

C.Y. Lam¹, K. Tai¹ ¹Nanyang Technological University, Singapore

p.67 Visionary Leadership as a Catalyst for Innovative Culture in SMEs

Bingwen Yan¹, Wilson Maladzhi¹, Oluwole Daniel Makinde¹ ¹Cape Peninsula University of Technology, South Africa

Extra-cluster Knowledge p.67 Search and Innovation Performance: An Empirical Study Based on Industrial Cluster Firms from Yangtze River Delta in China

Ru-yan Hong¹, Jianmei Miao² ¹Zhejiang University, Hangzhou Normal University, China ²Hangzhou Normal University, China

A Study of Regional p.67 Distributions and Dissimilarity Measures for Multi-Scale Nonlinear **Structure Tensor in Texture** Segmentation

Shoudong Han¹, Yong Zhao¹, Wenbing Tao¹ ¹Huazhong University of Science and Technology, China

p.68 Research on Project Portfolio Management of Product Development based on 3D Visualization

Angang Wei¹, Gang Zhao¹, Changyu Chen¹, Fei Wang¹ ¹Beihang University, China

Research of Idea Generation Process for Fuzzy Front End **Based on Patent Analysis**

Jing Guo¹, Ping Jiang¹, Jingwei Guo¹, Runhua Tan¹ ¹Hebei University of Technology, China

Virtual Human Emotional p.68 Behavior Model based on **Neural Network**

Na Ren¹, Tingting Zhao¹, Hongjiang Wang¹, Rongxue Zhang¹, Wenqiang Zhang¹, Nan Zhang¹ ¹Shenyang Institute of Engineering,

Research on Image Matting Technology Based on Image p.68 **Edge Detection**

Rongxue Zhang¹, Tingting Zhao¹, Renna ¹, Hongjiang Wang¹ ¹Shenyang Institute of Engineering, China

Decision Analysis & Methods (4)

Wed, 12 Dec 11:00 - 12:30 Room: S221

Chairs: Jin Han Park

Junzo Watada

Abstracts: see page 69

Factors for the Introduction of RFID on the Distribution Industry

Hsin-Pin Fu¹, Z.J Du², A Lin³, Y.L Lin¹ ¹National Kaohsiung First University of Science and Technology, Taiwan ²Ministry of Economic Affairs, Taiwan ³National Taipei University, Taiwan

Decision Evaluation for Damage Evaluation and **Prevention Analysis in Bank** Operational Risk Management

Aron Larsson¹, Sara Vickman¹

¹Mid Sweden University, Stockholm University, Sweden

Evaluating GHG Components using Artificial Intelligence: Connection Weight Approach Oludolapo Olanrewaju¹, Adisa Jimoh¹,

Pulek Kholopane²

¹Tshwane University of Technology, South

²University of Johannesburg, South Africa

The AHP-based Decision Making on Innovation Trajectories in Public Research and Development Organisations

Pawadee Meesapawong¹, Yacine Rezgui¹, Haijiang Li¹ ¹Cardiff University, United Kingdom

An Optimal LED Allocation System Based on Multilevel **Integer Programming Method**

Haw-Ching Yang¹, T.H. Tsai², H.W. Chen², F.T. Cheng² ¹National Kaohsiung First University, Taiwan

²National Cheng Kung University, Taiwan

Analyzing Consequences of Diabetes Mellitus Using **Intuitionistic Fuzzy Set**

Sujit Das1, Samarjit Kar2 ¹Dr. B.C. Roy Engg. College, India ²National Institute of Technology Durgapur,

Effects of Buyers Capacity Limitation in an Integrated Lead Time Controllable **Consignment Stock Inventory** System

Huizhi Yi¹, Bhaba Sarker¹ ¹Louisiana State University, United States

Human Factors (1)

Wed, 12 Dec 13:30 - 15:00 Room: S221

Chairs: Seng Fat Wong

Jia-Hua Lin

Abstracts: see page 70

Assessment of Architectural and Physical Factors in Human Resources Performance in **Project-Oriented Organizations**

Mona Foroozanfar¹, Mahmood Golabchi¹, Saied Yousefi¹ ¹University of Tehran, Iran

Effects of Load-Carrying Postures and Gender on Postural Sway

Xingda Qu1 ¹Nanyang Technolgoical University,

Study on Construction and Implement of User Model in Turret Display and Control System

Kan Zhang¹, Qing Xue¹, Minxia Liu¹, Beijing Institute of Technology, China

Human-computer Interaction Analysis of Turret Based on Context-Aware

Li-Ying Feng1, Qi-qi Yin2, Li-tao Wang1, Qing Xue² ¹Zhuhai Campus Beijing Institute of Technology, China ²Beijing Institute of Technology, China

The Comparison of Ergonomics Postures Assessment Methods in Rubber Sheet Production

Panya Wintachai¹, Nivit Charoenchai¹ ¹Chiang Mai University, Thailand

A Paper Prototype Usability Study of a Chronic Disease Self-management System for Older Adults

Da Tao¹, Calvin Or¹ ¹The University of Hong Kong, Hong Kong

Property of Worker Allocation Optimization with Two Professional Workers in Limited-Cycle Multiple Periods Xianda Kongʻ, Jing Sun², Hisashi Yamamoto¹, Masayuki Matsui³

¹Tokyo Metropolitan University, Japan ²Nagoya Institute of Technology, Japan ³Kanagawa University, Japan

Human Factors (2)

Wed, 12 Dec 15:30 - 17:30

Room: S221

Chairs: Xingda Qu Saied Yousefi

Abstracts: see page 71

Applied Human Factors Engineering in Advanced Carriage Design of Mass Transport System

Seng Fat Wong¹, Qili Chen¹
¹University of Macau, Macau

Managerial Compensation and **Earnings Management: From** the Managerial Overconfident Perspective

Jing Sun¹, Xiaofeng Jv¹, Yanmin Peng¹, Yue Chang¹

¹Harbin Institute of Technology, China

A Study and Survey on the Service Condition of Barrier-free Facilities in the Transportation System with **Ergonomic Evaluation**

Seng Fat Wong¹, Lili Zhong¹, Weng Keong Chan¹, Weng Hou Leong¹, Kin Seng Ho¹

¹University of Macau, Macau

Association of Visual Abilities, Motor Skill and Anticipation Responses on Parking

Performance
Bor-Shong Liu¹, Hsien-Yu Tseng¹,
Tung-Chung Chia², Tsung-Yen Ho¹,
Yu-Ho Chen¹ ¹St. John's University, Taiwan ²Ling Tung University, Taiwan

An Airworthiness SHELL Model for Aircraft Maintenance

Tsun Tat Wong¹, Sun Tong¹

¹Hong Kong Polytechnic University, Hong

The Mediating Impact of Ergonomics Between Existing Safety Culture And Targeted Safety Culture Amongst Safety And Health (SH) Practitioners

Rozlina Md Sirat¹, Awaluddin Mohamed Shaharoun ¹, Norhayati Zakuan¹, Syed Abdul Hamid Syed Hassan²

¹Universiti Teknologi Malaysia, Malaysia ²Ministry Of Human Resource, Malaysia

Ergonomics Effects of Work Pace And Work:Rest Ratio on Repetitive Powered Handtool Operations

Jia-Hua Lin¹, Raymond McGorry¹, Rammohan Maikala¹ ¹Liberty Mutual Research Institute for Safety, United States

Causing Mechanism Analysis of Human Factors in the Marine Safety Management Based on the Entropy

Haiyan Wang¹, Tingting Dai¹ ¹Wuhan University of Technology, China

Operations Research (4)

Wed, 12 Dec 11:00 - 12:30 Room: S222

Chairs:

Tatsushi Nishi Kiyoshi Sawada

Abstracts: see page 72

Investigating Sensitivity of Multi Response Optimization Methods

Nitendra Gautam¹, Om Prakash Yadav¹, Bimal Nepal²
¹North Dakota State University, United

²Texas A & M University, United States

Comparing Two Proposed Meta-Heuristics to Solve a New P-Hub Location-Allocation Problem

Ali Ghodratnama¹, Reza Tavakkoli-Moghaddam², Armand Baboli 3

¹University of Tehran, Iran, INSA-Lyon, DISP Laboratory, France

²University of Tehran, Iran ³INSA-Lyon, DISP Laboratory, France

Real Options Between Three Asymmetric Firms

Takashi Shibata ¹Tokyo Metropolitan University, Japan

Modeling Fixed-Sequence Multi-Stage News Agency for Efficient Message Total System

Abdullah Abdul Jabbar¹, Nashat Fors¹, Seraj Abed², Sherif Rabia¹¹¹Alexandria University, Egypt ²Kling Abdul Aziz University, Saudi Arabia

Use of Shrinkage and Grouping Approaches to Forecasting Seasonal Demand

Kui Zhang¹, Pengyi Gao², Ziwu Long¹ ¹Wuhan Polytechnic University, China ²Huazhong University of Science & Technology, China

DEA Sensitivity Analysis on the Factors Responsible for Industrial Energy Consumption: Case Study on the Canadian Industrial Sector

Oludolapo Olanrewaju1, Adisa Jimoh1, Pulek Kholopane²

¹Tshwane University of Technology, South

²University of Johannesburg, South Africa

Arbitrage and Spread in FX market: an Extended Glosten and Milgrom Model

Ming Ma1, Yufei Zhang2 ¹Beijing Institute of Technology, China ²Renmin University of China, China

Operations Research (5)

Wed, 12 Dec 13:30 - 15:00 Room: S222

Chairs: Om Prakash Yadav

Reza Tavakkoli-Moghaddam

Abstracts: see page 73

Optimal Pricing and Lot-sizing for Fresh Produce and Foods with Quality and Physical Quantity Deteriorating Simultaneously

Yiyan Qin¹

¹Guangxi University for Nationalities, China

Online Dispatching of Rail-Guided Vehicles in an **Automated Air Cargo Terminal**

Wuhua Hu¹, Jianfeng Mao¹ ¹Nanyang Technological University,

Maximizing the Total Weight Value of Just-In-Time Jobs in Identical Parallel Machines with Periodic Time Slots

Eishi Chiba¹, Takao Kageyama¹, Yoshiyuki Karuno², Hiroyuki Goto¹ ¹Hosei University, Japan ²Kyoto Institute of Technology, Japan

A New Lagrangian Decomposition and Coordination Approach for Energy Portfolio and Production Planning for Multiple Companies

Eiji Sekiya¹, Tatsushi Nishi¹, Masahiro Inuiguchi¹

¹Osaka University, Japan

Maximum-Profit Rooted **Not-Necessarily-Spanning Tree** Problem

Eishi Chiba¹, Yusuke Abe¹, Toshiki Saitoh², Takao Kageyama¹, Hiroki Koga¹, Takashi Kobayashi¹, Hiroyuki Goto1

¹Hosei University, Japan ²Kobe University, Japan

An Optimal Model for Adding Relation to an Indirect Subordinate in a Linking Pin **Organization Structure**

Kiyoshi Sawada¹ ¹University of Marketing and Distribution

MTS Lead Time Uncertainty Study in Periodic Review

MTS-MTO System
Feng Yu Wang¹, Rajesh Piplani², Laura
Xiao Xia Xu³, Amrik Singh Bhullar³
¹Singapore Institute of Manufacturing Technology, Nanyang Technological University, Singapore ²Nanyang Technological University, Singapore

³Singapore Institute of Manufacturing Technology, Singapore

Engineering Education and Training

Wed, 12 Dec 15:30 - 17:30

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Chairs: Kem Ramdass

Hon Keung Yau

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Research on Foundation and Practice of 123 Modes in Professional Engineer **Education Training Plan**

Wang Jinghua¹, Zhou Jun¹, Li Jing¹, Yang Zehui¹, Zhang Xinguang¹ ¹Ningbo University of Technology, China

Improving Capacity for Engineering Systems Thinking (CEST) among Industrial **Engineering Students**

Sigal Koral Kordova¹, Moti Frank¹ ¹Holon Institute of Technology, Israel

Management Model to Certification and Recertification Criteria to **Professional Engineers**

Oscar Alejandro Vasquez Bernal¹, Felix Antonio Ćortes Aldana² ¹UNAD, Colombia ²National University of Colombia, Colombia

Analyzing International Scientific Collaboration Pattern for China by Using ESI Database

Dan Xiang¹, Huaxing LI¹
¹Northwestern Polytechnical University,

Externalization Of Knowledge In Indian Higher Education Through Increase In Research **Publications**

Kalyan Kumar Bhattacharjee1 ¹Indian Institute of Technology, India

Towards Modeling Manufacturing Flexibility Information in Metalcasting **SMEs**

Rhythm Wadhwa¹ 1NTNU, Norway

Experience – An Essential Component to Improve the Confidence in Using Technology For Learning: An Empirical Study in Hong Kong **Higher Education**

Hon Keung Yau¹, Alison Lai Fong

Cheng²
¹City University of Hong Kong, Hong Kong
²Hong Kong College of Technology, Hong

Applying Fuzzy MADM Approach for the Selection of **Technical Institution**

Victor Gambhir¹, N.C. Wadhwa¹, Sandeep Grover², Sanjeev Goyal² ¹Manav Rachna International University,

²YMCA University of Science & Technology, India

Supply Chain Management (4)

Wed, 12 Dec 11:00 - 12:30 Room: S223

Chairs: Tsan-Ming Choi

Amr Eltawil

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Fuzzy Power Stream Mapping to Measure Dominating Power in Supply Chain Anirban Kundu¹, Vipul Jain¹

¹Indian Institute of Technology Delhi, India

Developing a Web-based Collaborative Forecasting Platform to Support Tourism Supply Chain Management

Xinyan Zhang¹, Haiyan Song¹
¹The Hong Kong Polytechnic University, Hong Kong

Determination of Size of Supply Base under Uncertain Cost Information

Jishnu Hazra¹, B. Mahadevan¹ ¹Indian Institute of Management, India

A Quantity-Flexibility Contract in Two Periods with Supply **Chain Coordination**

Xin Li¹, Zhaotong Lian¹, Wenhui Zhou² ¹University of Macau, China ²South China University of Technology,

Stochastic Demand Fulfillment Model with Multiple Demand Classes: Using Revenue Management \

Wen Yang', Richard Y. K. Fung²
¹City University of Hong Kong, China
²City University of Hong Kong, Hong Kong

Virtual Depot Approximation for the Transshipment Problem

Dmitry Krass¹, Oleksandr Shlakhter¹ ¹University of Toronto, Canada

Supply Chain Management (5)

Wed, 12 Dec 13:30 - 15:00 Room: S223

Chairs: Vipul Jain

Charles Mbohwa

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Ranking of Automotive Supplier Selection Criteria in Pakistan: An AHP Approach Fikri Dweri¹, Sharfuddin Ahmed Khan¹

¹University of Sharjah, United Arab

Modeling the Macro-environmental Influences: An International Logistics View

Supachart Iamratanakul¹, Bordin Rassameethes2, Vatcharapol Sukhotu3, Sununta Siengthai³, Voratas Kachitvichyanukul³, Ravi Shankar⁴ ¹Kasetsart University,Asian Institute of Technology, Thailand ²Kasetsart University, Thailand ³Asian Institute of Technology, Thailand ⁴Indian Institute of Technology, India

Information Security in Supply Chains - A Process Framework Arup Roy¹, A.D. Gupta¹, S.G.

Deshmukh²

¹Indian Institute of Technology Delhi, India ²ABV Indian Institute of Information Technology & Management, India

A Modeling of Retailers Pricing in Advance Selling Based on Fairness and Reciprocity Junfeng Li¹, Shuping Yi¹ ¹Chongqing University, China

A MILP Model and Heuristic Approach for Supply Chain Network Design with Minimum Volume Constraints

Mouna Kchaou Boujelben¹, Celine Gicquel², Michel Minoux³ ¹LGI Ecole Centrale Paris, France ²Universite Paris 11, France ³Universite Paris 6, France

Academic Supply Chain Management for Tertiary **Educational Institutions**

Bishwajit Banik Pathik¹, Md. Mamun

¹American International University-Bangladesh (AIUB), Bangladesh

Supply Chain Management (6)

Wed, 12 Dec 15:30 - 17:30 Room: S223

Chairs: Mahdi Bashiri Carman Ka Man Lee

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A Group Genetic Algorithm for the Fleet Size and Mix Vehicle

Routing Problem
Michael Mutingi¹, Charles Mbohwa²
¹University of Botswana, Botswana ²University of Johannesburg, South Africa

Optimizing Replenishment Policy for Deteriorating Item Considering Inventory Dependent Demand, Inspection and Imperfect production

Chun-Jen Chung ¹Aletheia University, Taiwan

Integrated Supplier-Buyer Inventory Model with Optimal Reorder Point, Controllable Lead Time, and Service Level Constraint

Yosi Agustina Hidayat¹, Suprayogi Suprayogi¹, Sifa Islam¹, David Try Liputra² ¹Bandung Institute of Technology (ITB),

²Maranatha Christian University, Indonesia

New Approaches for Analyzing the Logistical Synchronization of Material Provision in Production Networks

Patrick Prussing¹, Sven Baumgarten¹, Georg Ullmann¹ ¹Institute of Integrated Production Hannover gGmbH (IPH), Germany

An Optimization Based Decision Support Model for Thai Rubber Industry Supply Chain: **Preliminary Results**

Janya Chanchaichujit¹, Mohammed Quaddus¹, Martin West¹, Jose Saavedra-Rosas¹ ¹Curtin University, Australia

Modeling an Industrial Strategy for Inventory-Distribution Coordination of Telecom Operators in China: the 'Consignment Stock' Case

Tianjian Yang¹, Yujia Fan¹, Xinzhe Wang¹
¹Beijing University of Posts and Telecommunications, China

A Bi-objective Stochastic Programming Model for a Green Supply Chain with Deteriorating Products

Zeinab Sazvar¹, S.M.J. Mirzapour Al-e-Hashem², Armand Baboli ³, M.R. Akbari Jokar⁴, Yacine Rekik⁵ ¹Sharif University of Technology, Iran, INSA-Lyon, DISP Laboratory, France ²Emlyon Business school, INSA-Lyon, DISP Laboratory, France ³INSA-Lyon, DISP Laboratory, France ⁴Sharif University of Technology, Iran ⁵Emlyon Business School, France

An Order Splitting Policy for Deteriorating Products with Non-linear Holding Cost under Stochastic Supply Lead Time Zeinab Sazvar¹, M.R. Akbari Jokar²,

Armand Baboli ³

1Sharif University of Technology, Iran, INSA-Lyon, DISP Laboratory, France ²Sharif University of Technology, Iran 3INSA-Lyon, DISP Laboratory, France

Quality Control & Management (3)

Wed, 12 Dec 11:00 - 12:30 Room: S224

Chairs: Chen-ju Lin

Samuel Bassetto

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Customer Value Creation through Product Quality and Customer Usage of Product Functions: Managing the **Industry Shift towards** Smartphones

Bjoern Frank¹, Boris Herbas Torrico¹, Takao Enkawa¹ ¹Tokyo Institute of Technology, Japan

A Simple Method on Power Calculation in Experiments for

Treatment Comparison
Huairui Guo¹, Pengying Niu¹, Ferenc Szidarovszky1

¹ReliaSoft Corporation, United States

Empower the Future: A Culture of Empowerment - The Link to Organisational Effectiveness

Jurgens Frerk¹, Charles Mbohwa¹ ¹University of Johannesburg, South Africa

Process Reliability Modeling Based on Characteristic

Mapping Wei Dai¹, Fen Kuang¹, Jin An¹, Yu Zhao¹ ¹Beihang University, China</sup>

A Case Based Approach for **Modeling Process Elements and** Overall Service Quality Perception

Sheila Roy¹, Indrajit Mukherjee¹ ¹IIT Bombay, India

An Integrated Architecture for Lean Waste Analysis

Mohamed K. Omar¹, Rohana Abdullah², Md Nizam Abd Rahman² ¹Nottingham University Business School,

²Universiti Teknikal Malaysia Melaka, Malaysia

Information Processing and Engineering (1)

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Chairs: Jose Machado Hendry Raharjo

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Improvement of Retrieval in Case-based Reasoning for System Design

Thierry Coudert¹, Elise Vareilles¹, Laurent Geneste², Michel Aldanondo¹ ¹University of Toulouse, France ²LGP/ENIT - Université de Toulouse,

Construction of Transport Networks that Combine **Building Pathways and Roads** for Evacuation Routing and Scheduling Problem

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

A Case Study on Real-Time Parcel Delivery Sequence Optimization

Jaekyung Yang¹, Wooyeon Yu², Myoung . Jin Ćhoi³

¹Chonbuk National University, South Korea ²Myongji University, South Korea ³Howon University, South Korea

Comparing Complex Business Process Models

Philip Weber¹, Paul Taylor², Basim Majeed3, Behzad Bordbar1 ¹University of Birmingham, United Kingdom

³ET Innovate & Design, United Kingdom ³Khalifa University of Science, Technology and Research, United Arab Emirates

Critical Business Objects and Its Applications in Designing Performance Management

Mohamad Aghdasi¹, Ehsan Malihi¹, Yasaman Asadi¹, Shohreh Ghadami¹ ¹Tarbiat Modares University, Iran

Lossless Image Compression with Areas of Cross-Point Regions for Modeling

Tin Thanh Dang¹, Canh Xuan Huynh¹

1Hochiminh City University of Technology,

Information Processing and Engineering (2)

Wed, 12 Dec 15:30 - 17:30 Room: S224

Chairs: Tin Thanh Dang Thierry Coudert

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Usability of an Electronic Health Kecord

Rui Pereira¹, Julio Duarte¹, Maria Salazar², Manuel Santos¹, Antonio Abelha¹, Jose Machado¹ ¹University of Minho, Portugal ²Centro Hospitalar do Porto, Portugal

A Hybrid Evolutionary-based Process Mining Technology to Discover Parallelism Structures

Hsin-Jung Cheng¹, Yeh-Chun Juan², C. Ou-Yang¹

¹National Taiwan University of Science and Technology, Taiwan

²Ming Chi University of Technology, Taiwan

Logistics Process Modeling and **Execution in the Cloud**

Jens Leveling¹, Damian Daniluk¹, Arkadius Schier¹ ¹Fraunhofer Institute for Material Flow and Logistics IML, Germany

Application of Exploratory Data Analysis in Healthcare: the Case of Warfarin Initiation Phase in a Swedish Hospital

Hendry Raharjo¹, Baris Tekin¹, Jingren Chang¹
¹Chalmers University of Technology,

Sweden

Exploring How Add-On Software Development Affects Graphic Editors' Learning Results

Liang-Yuan Hsiung¹, Mu-Hui Lai², Hwa-Ming Nieh³, Yuan-Du Hsiao⁴ ¹Kun Shan University, Taiwan ²Hwa Hsia Institute of Technology, Taiwan ³Ming Hsin University of Science and Technology, Taiwan ⁴Chungyu Institute of Technology, Taiwan

Extendible Data Model for **Real-time Business Process** Analysis

Marcello Leida1, Andrej Chu1, Maurizio Colombo¹, Basim Majeed¹

¹Khalifa University of Science, Technology and Research, United Arab Emirates

Research on Real-time **Temperature Monitoring** System of Thermal Power

Jiang Guo¹, Ming-shu Fan¹, Kai-kai Gu¹, Xiao-Lu Xu¹, Ke-fei Zhang¹ ¹Wuhan University, China

Developing Kernel Intuitionistic Fuzzy C-Means Clustering for E-Learning **Customer Analysis**

Kuo-Ping Lin¹, Ching-Lin Lin¹, Kuo-Chen Hung², Yu-Ming Lu¹, Ping-Feng Pai³ ¹Lunghwa University of Science and Technology, Taiwan ²National Defense University, Taiwan 3National Chi Nan University, Taiwan

Production Planning & Control (4)

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Chairs:

Rashed Sahraeian

Ali Siadat

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Economic Production Quantity Model with Imperfect Quality During a Process Adjustment Period

Ismail Al-Me'raj1, Shokri Z. Selim1, Yahya Cinar¹ ¹King Fahd University of Petroleum and Minerals, Saudi Arabia

A Review of Key Research **Streams for Managing Uncertainties in Production** Planning and Control

Emrah Arica¹, Jan Ola Strandhagen¹, Hans Henrik Hvolby² ¹Norwegian University of Science and Technology, Norway ²Aalborg University, Denmark

A Novel Process Planning Approach for Hybrid Manufacturing Consisting of Additive, Subtractive and Inspection Processes Zicheng Zhu¹, Vimal Dhokia¹, Stephen

Newman¹

¹University of Bath, United Kingdom

A Real Time Event Supervisor System for Efficient Production Control

Emrah Arica¹, Sindre Grindheim¹, Olivier Roulet-Dubonnet¹ ¹Norwegian University of Science and Technology, Norway

The Problem of **One-Dimensionally Cutting** Bars with Alternative Cutting Lenghts in the Tubes Rolling Process

Richard Lackes¹, Markus Siepermann¹, Torsten Noll² ¹Technische Universitat Dortmund,

²V & M Deutschland Gmbh, Germany

Assembly Process Driven Product Architecting Harrys Daniilidis¹, Udo Lindemann¹

¹Technische Universitat Munchen, Germany

Systems Modeling and Simulation (1)

Wed, 12 Dec 13:30 - 15:00 Room: S225

Chairs: Szu Hui Ng Pei-Fang Tsai

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Estimating Machine Startup Timing with Petri Nets

Reggie Davidrajuh ¹University of Stavanger, Norway

Simulating Staffing Needs for Patient Registration in a Hospital

Sung Shim¹, Arun Kumar², Roger Jiao³
¹Seton Hall University, United States
²RMIT UNIVERSITY, Australia
³Georgia Institute of Technology, United

Simulation Based MANOVA Analysis of Pharmaceutical Automation System in Central Fill Pharmacy

Debiao Li¹, San Wong Yoon¹ ¹State University of New York at Binghamton, United States

Enriching the Generic Simulation Modeling and Executing Framework with the Statistical Software Package R and the SQLite Database

Dae-Eun Lim¹, Jangwon Cho², Haejoong Kim², Hyun-Min Park³ ¹Baek Seok University, South Korea ²Samsung Electronics, South Korea ³Pai Chai University, South Korea

Coil Baking Process Modeling with Neural Network

Wimalin S. Laosiritaworn¹
¹Chiang Mai University, Thailand

Integrated Optimization of Pricing, Production and Delivery Decisions in a SVMB System of Deteriorating Items and PSO Algorithm

Zhixiang Chen¹, Bhaba Sarker², Bingqing Wu² ¹Sun Yat-Sen University, China</sup> ²Louisiana State University, United States

System Reliability Modeling for Multi-state Hierarchical System with Multi-level **Information Aggregation**

Mingyang Li¹, Byoung Uk Kim², Jian

¹The University of Arizona, United States ²Ridgetop Group, United States

Systems Modeling and Simulation (2)

Wed, 12 Dec 15:30 - 17:30 Room: S225

Chairs: Reggie Davidrajuh Zhixiang Chen

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A Case Study of Using Simulation for Process Improvement in a Hospital Admission Center

Pei-Fang Tsai¹, Jian-Ciang Chen¹, Jhih-Han Chen¹, Fu-Man Lin², Porntipa Ongkunaruk ¹National Taipei University of Technology,

²Mackay Memorial Hospital, Taiwan ³Kasetsart University, Thailand

Applying the Informatinal Approach to Global Optimization to the Homoscedastic Stochastic Simulation

Jun Yuan¹, Chengwei Han¹, Szu Hui Ng¹
¹National University of Singapore, Singapore

SLA-Based Virtualized Resource Allocation for Multi-tier Web Application in Cloud Simulation Environment

Haitao Yuan¹, Jing Bi², Bo Hu Li³, Xudong Chai², Ming Tie⁴ ¹Beihang University, China ²Beijing Simulation Center, China ³Beihang University, Beijing Simulation Center, China ⁴Beijing Institute of Near space Vehicle's Systems Engineering, China

Simulation Study on the Effect of Diagnosis Related Group Design in Length-of-Stay and Case-Mix Index for Hospitals in Taiwan

Jian-Ciang Chen¹, Pei-Fang Tsai¹, Fu-Man Lin² ¹National Taipei University of Technology, ²Mackay Memorial Hospital, Taiwan

Synthetic Population - A Case Study of Hong Kong Population

Yam Hon Chan¹, Kwok Leung Tsui¹
¹City University of Hong Kong, Hong Kong

Consideration of Human Reliability in Actor-Oriented Simulation of New Product **Development**Soenke Duckwitz¹, Raymond Djaloeis¹,

Malte Hinsch¹, Joerg Feldhusen¹, Christopher M. Schlick¹ ¹RWTH Aachen University, Germany

Layout Redesign of a Warehouse through Modeling and Simulation

Chin Soon Chong¹, Feng Yu Wang², Laura Xiao Xia Xu¹, Eng Hock Lua¹ ¹Singapore Institute of Manufacturing Technology, Singapore ²Singapore Institute of Manufacturing Technology, Nanyang Technological University, Singapore

Picking Path Optimization of Automated Storage and Retrieval System

Xiaocui Miao¹, Lindu Zhao¹ ¹Southeast University, China

Service Innovation and Management (1)

Wed, 12 Dec 11:00 - 12:30 Room: S226

Chairs:

James K. C. Chen . Ville Ojanen

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Modeling Population Dynamics on a Spatially Distributed Service Network: Depicting the Influence of Socio-economic Factors on Service Delivery

Joymariel Melecio-Vinales¹, Alexandra Medina-Borja¹, J Medin² ¹University of Puerto Rico at Mayaguez, Puerto Rico ²University of Puerto Rico at Bayamon,

Puerto Rico

Microfoundations of Dynamic Capabilities: A Case Study in Airline Catering Industry

Emre Eksi¹, Ayberk Soyer¹, Sezi Cevik ¹Istanbul Technical University, Turkey

An Operational Definition of

Path Dependency Cigdem Kadaifci¹, Ayberk Soyer¹, Sezi Cevik Onar¹

¹Istanbul Technical University, Turkey

Developing a Measurement Model for Path Dependency

Burcu Akyildiz¹, Sezi Cevik Onar¹, Avberk Sover¹ ¹Istanbul Technical University, Turkey

The Driving Forces of Customer Involvement in Service Innovation from the Customer

Jun Jin1, Junying Chen1 ¹Zhejiang University, China

Characterizing Product-Service Systems in the Healthcare Industry - An Internal Stakeholder Perspective Man Hang Yip¹, Robert Phaal¹, David

Robert1

¹University of Cambridge, United Kingdom

Service Innovation and Management (2)

Wed, 12 Dec 13:30 - 15:00 Room: S226

Chairs: Zhaotong Lian

Alexandra Medina-Borja

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Applying Quality Function Development to Develop the Home Delivery Service Model for Specialty Foods in Traditional Market

Mu-Chen Chen¹, Chia-Lin Hsu², Ying-Yi ¹National Chiao Tung University, Taiwan ²Chinese Culture University, Taiwan

³President Transnet Corp., Taiwan

Research on Service-oriented Manufacturing Based on Service Knowledge Integrated **Platform**

Gao Na¹, Zhao Songzheng¹ ¹Northwestern Polytechnical University,

The Application of Value Innovation from Blue Ocean Strategy in Cultural Creative Industy

Tain-Fung Wu1, Chih-Lan Kao1 ¹Asia University, Taiwan

Pathway Identification via Process Mining for Patients with Multiple Conditions

Xiaojin Zhang¹, Songlin Chen¹ ¹Nanyang Technological University, Singapore

Service Recovery Matrix: Matching Service Failures and Recovery Options

Victor John Cantor¹, Richard Li¹ ¹De La Salle University - Manila, Philippines

Utilizing QFD in Creation of a New Industrial Service Concept

Ville Ojanen¹, Tatiana Shunina², Tuomo

¹Lappeenranta University of Technology,

²Siemens, Russian Federation

Exploring Innovation Model for Business Technology Incubator in Developing Countries

James K. C. Chen¹, Chu-Shiu Li¹, Amrita . Batchuluun¹

¹Asia University, Taiwan

Service Innovation and Management (3)

Wed, 12 Dec 15:30 - 17:30 Room: S226

Chairs: Willem Selen Songlin Chen

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The Impact of Culture, Leadership, Governance, and ICT Systems on Service Innovation in Service Value Networks

Renu Agarwal¹, Willem Selen² ¹University of Technology Sydney, Australia

²United Arab Emirates University, United Arab Emirates

The Relationships Between Beach Vacationers' Motivation and the Physical Settings of **Beaches**

Huey-Hsi Lo¹ ¹Aletheia University, Taiwan

Equilibrium Strategic Behavior and Optimal Pricing with **Experience Service**

Zhaotong Lian¹, Jinbiao Wu², Lihua Cao³

¹University of Macau, China ²Central South University, China ³Shenzhen University, China

Exploring CRM Implementation - The Conceptual Model of the Impact of CRM on Service Operations

Pimjai Tongmee¹, Prattana Punnakitikashem¹ ¹Mahidol University, Thailand

An Exploratory Study on Preferred Open Innovation Types and Partners in South African SMEs

Willie Krause¹, Corne Schutte¹, Niek Du Preez1

¹University of Stellenbosch, South Africa

External Marketing and Internal Marketing: Which Capability Holds the Key to an **Outstanding Performance?**

Wen-Jung Chang¹, Christina Tay²
¹Delin Institute of Technology, Taiwan ²Chinese Culture University, Taiwan

Technology and Knowledge Management (4)

Wed, 12 Dec 11:00 - 12:30 Room: S227

Chairs: Fu-Man Hsieh

Md. Mamun Habib

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Do Individual Emotion and **Corporative Environment** Influence Technology Transfer in Taiwan Technology Industry?

Meng-Shan Tsai1, Meng-Chen Tsai2, Chi-Cheng Chang²
¹National Kaohsiung Normal University, Taiwan

²National Taiwan Normal University, Taiwan

Research on Knowledge **Innovation Oriented** Post-evaluation Method of **Basic Research Project**

Lin Gong¹, Zixu Chen¹, Guoxin Wang¹, Jiping Lu¹

Beijing Institute of Technology, China

Analyzing the Building and Using Situations of E-learning Platform: From Total Quality Management and Knowledge **Management Perspectives**

Meng-Shan Tsai¹, Meng-Chen Tsai², Chi-Cheng Chang² ¹National Kaohsiung Normal University, Таітран

²National Taiwan Normal University, Taiwan

The Financial Impact of Using RFID in Healthcare

Ibrahim Al Kattan¹, Taha Anjamrooz¹ ¹American University of Sharjah, United Arab Emirates

Technology Evaluation: Fitting Tools and Techniques to the Stages of the Evaluation Process

Fernando Romero¹, Fernando Barbosa ¹*University of Minho, Portugal*

Knowledge Management Maturity Assessment in Research Institutions Using **Analytic Hierarchy Process and Fuzzy Comprehensive** Evaluation Method

Jingwen Li¹, Yaoguang Hu¹, Jialin Han¹ ¹Beijing Institute of Technology, China

Quality Dimensions Relevant to a First Tier Automotive Supplier: Case Study at an **Automotive Seat Cover** Supplier Kem Ramdass¹

¹University of Johannesburg, South Africa

Technology and Knowledge Management (5)

Wed, 12 Dec 13:30 - 15:00 Room: S227

Chairs: Sha'ri Mohd Yusof

Antonio Verdu

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Government as the Decision Maker in Infrastructure **Projects: What Diffusion** Models Tell Us

Ann Klobucher¹, Dan Edgar¹, Jessica Hildahl¹, Melissa Elfering¹, Harm-Jan Steenhuis¹

¹Eastern Washington University, United

Knowledge Engineering in Interdisciplinary Research Clusters

Claudia Jooss¹, Rena Vossen¹, Ingo Leisten¹, Anja Richert¹, Sabina Jeschke¹ ¹RWTH Aachen University, Germany

The Complementary of TQM on Technology Management Strategy: A Multinational Perspective from the ASEAN

Automotive Industry
Pei-Lee Teh¹, Tritos Laosirihongthong²,
Dotun Adebanjo³

¹Monash University, Malaysia ²Thammasat University, Thailand

³University of Liverpool, United Kingdom

Does Science and Technology Correlation with Academic Ability? a New Science and Technology Linkage Evaluation Ranking System Introduce

Yi-Ching Liaw¹, Chin-Yuan Fan², Te-Yi Chan², K. L. Chi²

¹Ming Chi University of Technology, Taiwan

²National Applied Research Laboratories, Taiwan

Critical Knowledge Sharing **Barriers: An Interpretive** Structural Modeling Approach Bhupendra Prakash Sharma¹, M. D.

¹Motilal Nehru National Institute of Technology, India

A Comprehensive Instrument to Efficiently Measure Firm IT Capability in an IT Environment

Chui Young Yoon¹, Seung Yong Kim¹
¹Korea National University of Transportation, South Korea

Facilities Planning and Management

Wed, 12 Dec 15:30 - 17:30 Room: S227

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Process Management within a

Armand Baboli

Multi-project Large-scale Plant Engineering Environment Egon Mueller¹, Ralph Riedel¹, Martin Domagk¹, Christian Barnstedt², Florian Meurs

¹Chemnitz University of Technology,

Germany

2MAN Diesel & Turbo SE, Germany

A New Multi-objective Mathematical Model for Relief Logistic Network under

Uncertainty Mohammad Rezaei-Malek¹, Reza Tavakkoli-Moghaddam¹ ¹University of Tehran, Iran

Bibliometric Analysis of Power Grid Research: Identifying **Knowledge Domain**

Ichiro Sakata¹, Hisato Tashiro¹ ¹The University of Tokyo, Japan

Exploring the Antecedent and Subsequence Factors for Knowledge Management

Meng-Chen Tsai¹, Chi-Cheng Chang¹ ¹National Taiwan Normal University,

A Location - Routing Problem with Emergency Referral Solved by Using a Genetic Algorithm

Phongchai Jittamai¹, Jarupong Banthao¹ Suranaree University of Technology,

A Single Phase Optimization of **Stochastic Location Allocation** Problem in a Two Echelon Supply Chain

Mahdi Bashiri¹, Mehdi Jafarian² ¹Shahed University, Iran ²University of Shahed, Iran

Factory Layout Benchmark with Extended Failure Mode and **Effect Analysis**

Uwe Dombrowski¹, Christoph Riechel¹ ¹Technische Universitat Braunschweig,

Major Accident Prevention in the Planning Process of Offshore Operation and Maintenance Activities - Initial Study

Sizarta Sarshar¹ ¹Norwegian University of Science and Technology/ Institute for Energy Technology, Norway

Reliability and Maintenance Engineering (3)

Wed, 12 Dec 11:00 - 12:30 Room: S228

Chairs:

Ping Jiang Bermawi Iskandar

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Risk Metrics: Interpretation and

Inger Lise Johansen¹, Marvin Rausand¹ ¹Norwegian University of Science and Technology, Norway

How to Develop the Grouping Strategy for Offshore Wind Turbines at the Wind Farm Level

Zafar Hameed¹, Jorn Vatn¹ ¹Norwegian University of Science and Technology, Norway

Reliability and Spare Parts **Estimation Taking into** Consideration the Operational Environment - A Case Study Abbas Barabadi¹, Behzad Ghodrati², Javad barabady¹, Tore Markeset³

¹University of Tromso, Norway ²Lulea University of Technology, Sweden ³University of Stavanger, Norway

Using Piecewise Exponential Model to Schedule Preventive Maintenance Interval in Manufacturing Systems

Liangpeng Chen¹, Boray Huang¹, Loon Ching Tang¹, Min Xie² ¹National University of Singapore, ²City University of Hong Kong, Hong Kong

Simulation on Optimum Operation of Ship Main Engine Support System by Using System Dynamics

Dhimas Handani¹, Makoto Uchida¹ ¹Kobe University, Japan

Reliability Optimization of a Series System with Multiple-choice and Budget Constraints Using a Genetic Algorithm

Alireza Zarei¹, Ahmadreza Zarei² ¹Hormozgan University, Iran ²University of Applied Science and Technology, Iran

Optimal Replacement Threshold and Inspection Interval for Condition-Based Maintenance with Variable **Failure Cost**

Hamid Reza Golmakani¹, Morteza Pouresmaeeli1 ¹Tafresh University, Iran

E-Business and E-Commerce

Wed, 12 Dec 13:30 - 15:00 Room: S228

Chairs: Yi-Hui Liang Bouchaib Bahli

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Cultural Adaptations of Macau's Casino Hotel Web

Chang Boon Lee¹, Stella Leong¹ ¹University of Macau, China

A Study of Impulse Buying in Virtual Communities

Guohong Wei¹, Chun Hu¹ ¹Beijing University of Posts and Telecommunications, China

Generic Modeling Propositions for Configuring, Sale, Product and Production

Linda Zhang¹, Elise Vareilles², Michel Aldanondo³, Petri Helo⁴ ¹IESEG School of Management, France ²University of Toulouse, France ³Toulouse University, France ⁴University of Vaasa, Finland

Evaluations of A Core Broking Model from the Viewpoint of Online Group Trading Pen-Choug Sun¹, Michael Odetayo²,

Rahat Iqbal², Anne James² ¹Aletheia University, Taiwan ²Coventry University, United Kingdom

The Effect of Online Group-buying on Off-line

Buying Decisions
Junieng Liao¹, Xichen Dong¹, Xunqi Liu¹

1 South China University of Technology,

Study on the Loss of Social Welfare Caused by Search in the Market Based on the **Asymmetric Information**

Qiong Wang¹, Shixiang Huang¹ ¹University of Anhui Agricultural, China

Project Management (2)

Wed, 12 Dec 15:30 - 17:30 Room: S228

Chairs: Norbert Trautmann Marie-Louise Barry

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Entering the Nuclear Power Plant Supply Chain: the France Case Study

Giorgio Locatelli¹, Mauro Mancini², Gianluca Cocco², Valentino Ruzzon² ¹University of Lincoln, United Kingdom ²Politecnico di Milano, Italy

Bidding Decision Making in Construction Industry: An Analysis Based on Procedural Rationality

Zhuo Feng¹, Shuibo Zhang¹, Ying Gao¹, Fei Kang¹
¹Tianjin University, China

Strategic Resource Planning Based on Staffing Profiles

Eduardo Miranda ¹Carnegie Mellon University, United States

Theory of the Triple Constraint

- a Conceptual Review
C. Jurie Van Wyngaard¹, Jan-Harm
Pretorius², Leon Pretorius³
¹Graduate Universities of Johannesburg and Pretoria, Employee Saab Electronic Defence Systems, South Africa ²University of Johannesburg, South Africa ³University of Pretoria, South Africa

Accounting for Risk Interactions and Using Importance Measures for Risk Prioritization in Project Management

Chao Fang¹, Xun Xiao¹, Xiaoyan Zhu²¹City University of Hong Kong, Hong Kong²University of Tennessee, United States

Perceptual Differences Between Project Managers and Sponsors in the Intiation Phase of a Project

Stephen Onu1 ¹University of Maryland, United States

Risk Management for **Construction Projects with** Colored Petri Nets: an Agent-Based Modeling Framework

Yangbing Zhang¹, Yongqiang Chen¹, Xingyu Zhu¹ ¹Tianjin University, China

On Deployment of Empowered Team Concept into Matrix Organization

Hanwei Xu¹, Bin Lin¹, Minmin Shen¹ ¹Siemens Ltd. China, China

Robust Optimization of Project Portfolio Selection and Scheduling Problem with Stochastic Returns Ying Li¹, Yongyi Shou¹ ¹Zhejiang University, China

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Strategy for Virtual Factory Information System Design Yuqiuge Hao¹, Ahm Shamsuzzoha¹,

Petri Helo¹

¹University of Vaasa, Finland

Virtual Enterprise Management: Perspective of Process-Based Business Collaboration

AHM Shamsuzzoha¹, Filipe Ferreira², Jose Faria², Americo Azevedo³, Yuqiuge Hao1, Petri Helo1 Hao', Fetti Heo' 'University of Vaasa, Finland 'INESC TEC, Portugal 'INESC TEC, Faculdade de Engenharia da Universidade do Porto, Portugal

The Relationship among Country of Origin Effects, Brand Image and Purchase Intentions in Taiwanese Apparel Market

Chu Erh Hsiung¹, Cheng-Ter Ho¹ ¹National Kaohsiung University of Applied Sciences, Taiwan

Scientific Catch-up Process in Asian Countries: A Case Study of Solar Cell

Ichiro Sakata¹, Hajime Sasaki¹, Hisato Tashiro¹, Aya Ishihara¹, Keiko Kayukawa ¹The University of Tokyo, Japan

Technology Gap, Market Experience and MNCs' **Technology Licensing** Strategies: Evidence from China

Lei Xiong¹, Xiaobo Wu¹, Rui Guo¹, Ruishe Zeng¹ ¹Zhejiang University, China

Using System Thinking to **Investigate Co-Opetition** Analysis for Manufacturers in

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Global Product Development: the Experience in a Brazilian Manufacturing and Assembler Automotive Subsidiary

Andre Segismundo¹, Paulo A. Cauchick Miguel²

¹University of Sao Paulo, Brazil ²Federal University of Santa Catarina,

The Impact of Guanxi on Internationalization Entry **Mode for Chinese Enterprises:** A Multiple-Case Study

Rongjun DU1, Xiaobo Wu1, Xubo Bai1 ¹Zhejiang University, China

Latest Developments Aiming an Integrated Management System Tool Focusing Maturity Assessment

Jose Pedro Teixeira Domingues¹, Paulo Sampaio¹, Pedro Arezes¹

¹*University of Minho, Portugal*

Facilitating Customer Involvement Into the Decision-making Process of Concept Generation and Concept Evaluation for New Product Development

Chih-Hsuan Wang¹ ¹National Chiao Tung University, Taiwan

Information Interpretation-oriented Integration Interface for Manufacturing Enterprises

Changyu Chen¹, Gang Zhao¹ ¹Beihang University, China</sup>

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Lea Hannola¹, Ville Ojanen¹, Sirra Toivonen², Tuomo Kassi¹
¹Lappeenranta University of Technology, ²VTT Technical Research Center of Finland,

Development of a Barrier Management System for Continuous Monitoring and Maintenance of Safety Barriers

R.M. Chandima Ratnayake¹, Sukvir Panesar Singh², Jawad Raza² ¹University of Stavanger, Norway ²Apply Sorco, Norway</sup>

How Can We Improve Healthcare Management for Patient Safety by Analyzing Large-Scale Incident Reports?

Masanori Akiyama¹, K Fujita¹The University of Tokyo, Japan

Prediction of Soleplate Corrosion in Petroleum Storage Tank Based on Grey Model GM(1,1)

Xiao-gang Zhao¹, Yi Zhou¹, Fei Cheng¹, Jian-cheng Zhu², Jie Zheng², De-peng Gao 3

¹Logistical Engineering University, China ²Beijing Military Region, China ³Jinan Military Region, China

Modeling and Reliability Assessment of a 3-channel Safety-instrumented System

Yiliu Liu¹, Marvin Rausand¹, Hui Jin¹ ¹Norwegian University of Science and Technology, Norway

Dynamic Measurement and **Evaluation on Foreign Exchange Risks of International Construction Projects**

Xiuqin Wang¹, Bin Gao¹
¹Tianjin University, China

Resilience Measurement for A Class of Supply Chain Disruption

Shu Yi¹, Xinping Wang¹, Lindu Zhao¹, Micheal Herty ¹Southeast University, China ²RWTH Aachen University, Germany

Estimating the Remaining Useful Life of Li-ion Batteries with a Bayesian Updating Model

Yizhen Hai¹, Jie Tang¹, Kwok Leung

¹City University of Hong Kong, Hong Kong

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Elham Taghizadeh¹, Mostafa Abedzadeh¹, Mostafa Setak¹ ¹K.N.Toosi University of Technology, Iran

p.96 Impact of Customer Response to Retailer Stock-out on Supply Chain Performance

Xiaoling Zhang¹, Qiang Lu¹, Teresa Wu² ¹Harbin Institute of Technology Shenzhen Graduate School, China ²Arizona State University, United States

p.96 Pricing and service level strategies based on customers Junxiu JIA¹, Z. Yuan¹

Junxiu JIA¹, Z. Yuan¹

¹Xidian University, China

p.96 A Simulation Based Experimental Investigation of Demand and Supply Uncertainty

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¹The Hong Kong Polytechnic University,
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²Nanyang Technological University,
Singapore

p.96 Forecasting Product Returns Using Causal Analysis and Multiple Linear Regression

Shantanu Chakraborty¹, Rajesh Kumar¹, Prasanna Akella¹, Satyendra Singh¹

¹Hewlett Packard, India

p.96 Evaluating Retailer Consumer Return Policy under VMI Partnership

Shahrokh Hematyar¹, S. Kamal Chaharsooghi² ¹P.N. University, Iran ²Tarbiat Modares University, Iran

p.96 Decision Aided Tool for Recycled Spare Parts Management Under Uncertainties

Uncertainties
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Abderrahman ElMhamedi², Younes
Boujelbene³
¹University of Paris 8, France,
University of Sfax, Tunisia
²University of Paris 8, France
³University of Sfax, Tunisia

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Hao-yun Yan¹, Bin Wu¹, Hong-yu Li²

¹Shanghai Dian Ji University, China

²Fudan University, China

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Leichuan Lin¹, Shan-Yau Wu¹
¹National Kaohsiung University of Applied Sciences, Taiwan

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Guowei Hu¹, Zhaohong Bie¹, Bowen Hua¹ ¹Xi'an Jiaotong University, China

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Jialin Han¹, Yaoguang Hu¹, Jingwen Li¹, Qiqi Yin¹ ¹Beijing Institute of Technology, China

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¹Arts et Metiers ParisTech, France

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Kenta Takii¹, Shunji Tanaka¹ ¹Kyoto University, Japan

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Singapore Institute of Manufacturing Technology, Singapore
²Singapore Institute of Manufacturing Technology, Nanyang Technological University, Singapore

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Kuo-Chen Hung', Kuo-Ping Lin² ¹National Defense University, Taiwan ²Lunghwa University of Science and Technology, Taiwan

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Hung-Tso Lin¹, Yin-Chi Huang², Chia-Hua Lee¹ ¹National Chin-Yi University of Technology, Taiwan ²Feng-Chia University, Taiwan

p.98 A Game Theoretic Model for Analysis of Material Reuse Modularity

Yangjian Ji¹, Roger Jiao², Liang Chen¹, Chunlong Wu¹, Hao Li³ ¹Zhejiang University, China ²Georgia Institute of Technology, United States ³Zhejiang University, Zhengzhou University of Light Industry, China

p.98 The Impacts of Product Delay Cost on Rush Order Decision for Job Shop Production Systems

Min Wang¹, Cheng-Yu Huang², Chun-Yuan Cheng¹ ¹Chaoyang University of Technology, Taivoan ²WIN Semiconductors Corporation, Taivoan

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> Audit Rongbing Huang¹ ¹Nanjing Audit University, China

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Fan Xu¹, Shengdun Zhao¹, Jun Lin²
¹Xi'an Jiaotong University, China
²NO.59 Institute Of China Ordnance
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Bin Zhong¹, Shengdun Zhao¹, Renfeng Zhao¹, Fan Xu¹ ¹Xi'an Jiaotong University, China

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Zhiqiang Xu¹, Jialiang He², Zhiyong Chen³
¹Nanyang Technological University,
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²Northeast Petroleum University,
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³Chengdu Wisdom Technology Co.Ltd,
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Selina Ng¹, Kwok Leung Tsui¹¹City University of Hong Kong, Hong

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> Chun-Wu Yeh1, Tean-Quay Lee2, Chih-Chiang Fang²
> ¹Kun Shan University, Taiwan ²Shu-Te University, Taiwan

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Xingye Dong¹, Ping Chen², Houkuan Huang³, Maciek Nowak⁴ ¹Beijing Jiaotong University, China, Loyola University, United States ²NanKai University, China ³Beijing Jiaotong University, China ⁴Loyola University, United States

Quay Crane Sequencing p.99 Considering Productivity, Interference and Yard **Congestion Constraints**

Effrosyni Theodorou¹, Ali Diabat¹, Davor Svetinovic¹ ¹Masdar Institute of Science and Technology, United Arab Emirates

A Multi-Objective Model in p.100 the Green Supply Chain Network Design

Farzad Niakan¹, Armand Baboli ², Reza Tavakkoli-Moghaddam³, Valerie Botta-Genoulaz², Jean-Pierre Campagne² ¹University of Tehran, Iran, INSA-Lyon, DISP Laboratory, France ²INSA-Lyon, DISP Laboratory, France ³University of Tehran, Iran

Development of an EOQ Model for Single Source & Destination, Deteriorating **Products Incorporating Price** & Freight Discount under Fuzzy Environment

Kanika Gandhi1, P.C. Jha1, Yogender Singh1

¹University of Delhi, India

Optimal Duration and Control of Promotional Campaign for Durable Technology Product

Sugandha Aggarwal¹, Anshu Gupta¹, Yogender Singh¹, P.C. Jha¹ ¹*University of Delhi, India*

p.100 An Integrated Model for Quay Crane Assignment and Quay Crane Scheduling Problems

> Yi-Min Fu1, Ali Diabat1, I-Tsung Tsai1 ¹Masdar Institute of Science and Technology, United Arab Emirates

p.100 Optimization of the Billet **Cutting Operation in the** Aluminum Industry: a Case

Nadjib Brahimi1, Abrar Khalaf2, Hebah Al-Hammadi³ ¹University of Sharjah, United Arab **Emirates** ²Dubai aluminium, United Arab ³Dubai Cable Company (DUCAB), United Arab Emirates

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Rong-Hwa Huang¹, Chang-Lin Yang¹ ¹Fu Jen Catholic University, Taiwan

p.100 A Revised Model for the Static Berth Allocation Problem with Berth Restrictions on Vessel Assignment

Ahmed Simrin¹, Shaikha Al Zaabi¹, Ali Diabat¹ ¹Masdar Institute of Science and Technology, United Arab Emirates

Evaluation of C4ISR System p.100 Effectiveness based on Markov Logic Networks

Ruotong Liao1, Yanjun Liu1, Zhong Liu¹, Qian Meng¹, Xunhui Luo¹
¹National University of Defense
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Evaluation of Project's p.100 Alternatives Based on a Multi Criteria Decision Approach

Mohammadhosein Mokhtarani¹, Hamed Shakouri G¹, H Soleimani¹ ¹University of Tehran, Iran

Aircraft Trip DOC p.100 Parameters: A Function of Stage Length, Seat Capacity and Design Range

Yu Wang¹, Hong Sun¹, Peiwen Zhang¹¹¹Civil Aviation Flight University of China, China

Stock Characteristics and p.101 Transaction Cost in Japanese Stock Market

Junji Mawaribuchi1, Koichi Miyazaki² ¹Mitsubishi UFJ Trust Investment Technology Institute Co., Ltd., Japan ²The University of Electro-Communications, Japan

p.101 A Bibliometric Description and Content Analysis of Mega-project Characteristics Xiaofeng Peng¹, Wen Che¹, Yongyi Shou1

¹Zhejiang University, China

p.101 Empirical Study on the Relationships Between Leadership and Technology Entrepreneurial Performance

Cuixia Wang¹, Jianmei Miao², Weiwei Ye¹, Xu Yi¹ ¹Zhejiang University, China ²Hangzhou Normal University, China

Study and Application on Aided Innovation Design p.101 Method Based on Semantic Analysis and TRIZ theory Zixu Chen¹, Lin Gong¹, Yan Song¹,

Guoxin Wang¹ ¹Beijing Institute of Technology, China

p.101 The Exploration of Transform Leadership and Organizational Performance --- Two Mediators' Model Chi-Chuan Wu1, Fang Chia Hsieh1, Chien-Wei Ho¹
¹Tatung University, Taiwan

Corporate Citizenship p.101 Taking on Social Welfare: Concept Area and Competitive Advantage

Xueying Tian¹
¹Suzhou University of Science and Technology, China

The Establishment of Model p.101 for Measuring Interpretation Satisfaction: The Role of Service Quality and Perceived Interpretation Value

Li-Hui Chang¹, Cheng-Shih Lin¹, Tsen-I Kuo¹ ¹National Quemoy University, Taiwan

Socially Responsible Service p.101 Operations Management -Trends and Challenges

Hosang Jung¹, Seungbae Sim² ¹Sangmyung University, South Korea ²Yonsei University, South Korea

A Rapid Optical System for p.102 Surface Roughness Measurement of Hard Films

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Simulation Study on p.102 Quality Risk of Quality Organizational Structure Based on Agent-based Model

Chunhui Yang¹, Tao Hu¹, Zhaohui Luo¹, Lei Yang¹ ¹Naval University of Engineering, China

Quality Monitor in p.102 Multi-operation Machining Processes based on Wavelet Filtering

Bing Chen¹, Pei Wang¹, Dinghua Zhang¹, Kai Liu¹ ¹Northwestern Polytechnical University, China

p.102 The Joint Impact of Process Ownership and Continuous Process Improvement on Financial Performance and **Customer Satisfaction**

Doris Weitlaner¹, Markus Kohlbacher¹, Andreas Kamagaew² ¹CAMPUS 02 University of Applied Sciences, Austria ²Fraunhofer Institute for Material Flow and Logistics, Germany

ABSTRACTS

Decision Analysis & Methods (1)

Date Tue, 11 Dec Time 11:00 - 12:30 Room S221

Kuo-Ping Lin, Wasawat Nakkiew Chairs

Performance Management in the Elementary and Secondary Schools' Information Unit in Taiwan: Using the Balanced Scorecard and the Fuzzy Analytic Hierarchy **Process**

Yi-Hui Liang¹

¹I-SHOU University, Taiwan

The purpose of this study is to establish balanced scorecard in performance measurement of Elementary and Secondary Schools' Information Unit. Balanced scorecard used as a measurement tool to assess the study subject can be divided into four perspectives: finance, customer, inter process, learning and growth. In order to extract the knowledge and experience from related experts to pick out important evaluation criteria and opinion, this study combines fuzzy theory and the analytical hierarchy process to calculate the weights. After completing the weight calculation of every dimension and indicator, balanced scorecard model of this study is thus established. This model can be utilized by the information units of elementary and secondary schools for constructing the strategies and blueprints for self evaluation. This study also provides important information for effective resource management in information education of elementary and secondary schools.

An Analysis Framework for Urban Construction Decision-making Based on Symbiosis

Chunying Huang¹, Xiaoming Wang²

1Huazhong University of Science and Technology, China Three Gorges University,

²Huazhong University of Science and Technology, China

The paper studies decision analysis for urban construction from the perspective of harmonious symbiosis between urban construction and its environment. The purpose is to promote the harmony and sustainability of urban construction and development. A symbiotic city model is proposed, regarding the whole of urban construction projects and the environment as a living symbiont, and showing symbiotic relations between urban construction and the environment. Through introducing the symbiotic city model into the field of urban construction, an analysis framework for urban construction decision-making is established, which conduces to harmonious symbiosis between urban construction and the environment. Case study demonstrates how this analysis framework works. Some recommendations are given to solve the problems of urban construction decision-making according to the analysis of the cases.

Establishing A New Preliminary Evaluation Criteria System Model for Green Restaurants

Ching-Yu Lien¹, Bor Min Tsai¹, Hsin-Yen Wu¹

¹Minghsin University of Science and Technology, Taiwan

In this study, we try to develop a new preliminary evaluation criterion of green restaurants for government and restaurant owners as a guideline. To help them to reconsider the restaurant operation set up and future restaurants' consumption trend, based on the questionnaire results, the correlation analysis and exploratory factors analysis (EFA) are applied. This study will try to develop a new preliminary, appropriate and trusted evaluation criteria model of green restaurants for government and further extended research usage. According to the results, a new preliminary evaluation criteria model for green restaurants built in this study would be focused on two major dimensions which are "Restaurant green building design" and "Restaurant outlet organization". There are four sub dimensions which are "Energy -saving equipment usage", "Natural green design", "Reuse of tableware resources" and "Repair, maintain and extend the life of the equipments" would be considered deeply in the future extended research,

A Multi-Criteria Decision Support Model for TV Series Selection

Cigdem Kadaifci¹, Ilker Topcu¹, Umut Asan¹

¹Istanbul Technical University, Turkey

In a highly competitive environment like that of the television industry, TV channels have to pay increasingly more attention to the target audiences' preferences to stay relevant and profitable. Especially the rapid growth in the number and variety of available TV series signals the need for a better understanding of the criteria

that influence audience's choice most. A practical and reliable method for analyzing such criteria with respect to their relevance to choice of TV series is still missing in the literature. To address this issue, in this study, an Analytic Hierarchy Process model based on judgments of the audience is proposed to support TV channel managers' decision on TV series to be broadcast. The results of the study suggests that the criteria "Script" (and its sub-criteria Originality) and "Cast" (and its sub-criteria Performance of Actors) have the highest impact on the choice of TV series the audience will watch.

A Matching Procedure for Goal-oriented Productivity Improvements

Thomas Czumanski¹, Jonina Jonsson², Hermann Lodding¹ ¹Hamburg University of Technology, Germany

²Beiersdorf AG, Germany

Improving the productivity of production processes remains a major goal of industrial companies to achieve low costs and high resource utilization. For this purpose, productivity management approaches including the concept of lean production provide a number of methods and tools. Furthermore, companies adopt procedures and toolsets and tailor them to their production systems and specific needs. Setting up the right activities by using the right methods is therefore crucial to establish a goal-oriented and efficient improvement process. This article presents a straightforward approach to link identified problem fields to adequate productivity improvement methods through a simple matching procedure. Relying on a standardized root cause assignment, the case example shows its applicability to a real industry setting and its contribution towards efficient and effective improvement activities.

Ranking of Problematic Equipment using Six Big Losses and Analytic Hierarchy Process

Ratapol Wudhikarn¹

¹Chiang Mai University, Thailand

This paper intends to improve the problem of overall equipment effectiveness (OEE) in the case of equipment performance rankings. Currently, OEE roughly considers the six big losses by grouping them into three main elements. Furthermore, the OEE also considers the weights of its elements the same. The mentioned characteristics possibly lead to incorrect machine rankings as well as incorrect decision making. Therefore, this study proposed a new way to consider the six big losses by using AHP. This approach allows the decision maker to directly consider the six big losses and, moreover, it also delivers different importance among these major losses. For these reasons, the proposed method can deliver appropriate rankings better than the original OEE.

A Real Options Analysis with CVA on Optimal Decision of Regulatory Capital for the Basel Capital Accord III

Tyrone T. Lin¹, H. J. Chen¹

¹National Dong Hwa University, Taiwan

This paper aims to study how financial institutions deal with the requirements when facing the requirements of the Basel capital accord III (Basel III) sequence from 2013-2019 for the progressive increase of capital of various risk asset requirements, and whether financial institutions can make value if they reach the target in advance. In this paper, in accordance with Regulatory Capital, financial institutions make the goal of the expected minimum cost to determine the future of each year if financial institutions reach the limitation of the Basel agreement in advance. By meeting the minimum Bank of International Settlement ratio and credit value adjustment (CVA) measure model, this paper explores the issue and then applies the real options approach to analyze how to make right decisions. In brief, the key issue of this paper is to help financial institutions make valuable decisions under the requirements of Basel III.

Session Decision Analysis & Methods (2)

Date Tue, 11 Dec Time 13:30 - 15:00 S221 Room

Chairs Imad Alsyouf, Yi-Hui Liang

A Methodology for Product Line Design with Consideration of Supplier Selection

S.F. Deng¹, C.K. Kwong¹, Xinggang Luo², H.M. Jiang¹ ¹The Hong Kong Polytechnic University, China

²Northeastern University, China

Product line design is commonly used to provide higher product variety for satisfying diversified customer needs. To reduce the cost and development time and improve quality of product lines, companies quite often consider sourcing. Conventionally, product line design and supplier selection are dealt with separately. In this paper, a methodology for product line design with consideration of supplier selection is proposed to determine the specifications of product variants of a product line and selected suppliers for maximizing the profit, quality and performance of the product line. A case study of the product line design of portable computers was conducted to illustrate the effectiveness of the proposed methodology. The results have shown that Pareto optimal product line designs and the specifications of product variants can be determined. On the other hand, suppliers of component and modules can also be selected. Prices and positions of the product variants can also be estimated.

Does Delighting Customers to Inspire Loyalty Moderated by Lodging Motivation?- A Case Study on Five-Star Hotels in Mid-Taiwan

Yung-Hsin Chen¹, Xia Wang², Shuo-Chang Tsai³, Ingrid Teng³ ¹National Cheng Kung University, Taiwan ²Renmin University of China, China

3Asia University, Taiwan

That customer satisfaction leading to repeat patronage and profitability has been a well-established paradigm in the service literature. For hospitality business especially five-star hotel for international tourist where customers make a visit less frequently, extra efforts should be paid in service innovation to win satisfaction and beyond. Customer delight enabling acts bring about elements of joy, excitement and surprise are intended to sustain and enhance loyalty manifested in the form of revisit, word-of-mouth and recommendation. The less visited areas are the role of delight as a mediator in the association between customer satisfaction and lovalty as well as how delight should be differentially addressed depending This study based on the theory expectancy-disconfirmation to extend the prior research, making a contribution to fill the gap of the delight literature by an empirical

Objective Product Family Design Analysis Using Self-Organization Map

Ningrong Lei¹, Seung Ki Moon¹

¹Nanyang Technological University, Singapore

In this paper, we investigate an analysis tool which can be used to identify the number of platforms in product family design. The proposed tool is based on the cognitive signal processing technique of Self-Organizing Map (SOM). We consider that a product family can be designed in product family design space where each product is just one point or vector in this space. SOM is employed to analyze the pattern of the data set based on the weight of the design variables. The proposed analysis tool automates the mapping of product point into platform clusters to generate the number of platforms in a particular product family. We apply the proposed tool to determine the number of platform using a case study involving a family of universal motors.

Evaluations on and Suggestions for the Sustainable Development of Shaanxi

Shuyan Gong¹, Weili Xia¹

¹Northwestern Polytechnical University, China

This article builds a system of indexes for the sustainable development of Shaanxi's ecosystems. By the data envelopment analysis method, it conducts analytical and comprehensive evaluations and analysis of the capacity for the sustainable development of the province's ecosystem between Year 2001-2009 in terms of its economic system, ecosystem, population system and

social progress. Advantages and problems concerning sustainable development of this system are identified and suggestions are made correspondingly so as to provide scientific basis for the decision sustainable development capacity building making, management of the ecological economic system of Shaanxi.

The Combination of Lean Thinking and Systems Thinking in the Design of Manufacturing Systems

Pascal Hofmann¹, Daryl Powell¹

¹Norwegian University of Science and Technology, Norway

Manufacturing systems are crucial in competitive battles in many industries all over the world and become more and more complex to design. A continuance of competitiveness requires holistic systems approaches that use interdisciplinary methods to improve the design of manufacturing systems, such as the combination of lean thinking and systems thinking. A poor design will typically result in defects and over-processing, which will also lead to waiting for a redesign. In this respect, the adoption of a systems engineering perspective will contribute to the reduction of waste within lean thinking, therefore we attempt to combine the two approaches for more effective design of manufacturing systems. The research considers a selection of contemporary literature and takes insights from a practical case study in order to develop a framework which shall support lean systems engineering thinking.

Portfolio Decision Analysis in Vague Domains

Tobias Fasth¹, Aron Larsson²

¹Stockholm University, Sweden

²Mid Sweden University, Stockholm University, Sweden

Portfolio Decision Analysis (PDA) is applicable in many domains and is therefore an important part of Decision Analysis (DA). PDA enables the identification of a preferred portfolio of alternatives instead of a single alternative, which is the typical case in traditional DA. The DELTA framework for interval decision analysis enables a decision maker to model and evaluate decision problems in vague domains with imprecise information, however, it does not support PDA. This paper presents an extension of the DELTA method so that portfolio decision problems can be modelled and evaluated within that framework. The extension is based on a set of reasonable requirements, and an evaluation of the PDA methods PROBE, RPM and Equity.

A Decision-making Model on Concession Period of Public Rental Housing BOT Project

Jingjing Zhu¹, Guangmou Wu¹

Southeast University, China

It has been clear that the development of public rental housing is one of the important tasks in developing counties. The aim of this paper is to discuss the feasibility of using private capital to solve the problem of construction funds shortage, so BOT model is introduced to the construction of public rental housing. Because of the rental income uncertainty in future and the irreversibility of investment decision, this paper develops a financial subsidy model based on real options theory to encourage private investors to participate in the construction of public rental housing. Then, a decision-making model on concession period is established based on the proposed subsidy model to protect the interests of both the government and private investors. Finally, a numerical example is presented to verify the feasibility of the proposed decision-making model and the influence of discount rate required by private investors on concession period.

Session Decision Analysis & Methods (3)

 Date
 Tue, 11 Dec

 Time
 15:30 - 17:30

 Room
 S221

Chairs C.K. Kwong, Min Wang

Business Feasibility Methodology for Introducing New Developed Local Food Product

Wasawat Nakkiew¹, Jaruwan Wannagoat¹, Wassanai Wattanutchariya¹, Anirut Chaijaruwanich¹

¹Chiang Mai University, Thailand

Several of Thai local food products have problems in launching in a wider market, especially outside its original region due to the lack of practical approaches in analyzing both the marketing aspects and relating business issues. The objective of this paper is to provide a business feasibility methodology mainly for an investor in making decision about introducing these products to the market. The proposed methodology consists of marketing step, business analysis tools step, and the financial analysis step. All of these steps include many business analyzing tools such as STP, SWOT, and so on. The results from all the steps will be beneficial for a decision maker or an investor who decide whether to launch the product to the market as well as for continuing product development. The case study of the northern Thai style sausage will be used for demonstrating the methodology.

An Investigation of Robust Optimal Design Using Artificial Neural Network and Genetic Algorithm

Kiatkajohn Worapradya¹, Purit Thanakijkasem¹

¹King Mongkut's Ûniversity of Technology Thonburi, Thailand

Robust optimal design using metamodeling techniques plays an important role in the design under uncertainty. This paper investigates the construction and application of artificial neural network (ANN) as the metamodel in a robust optimization using Genetic Algorithm (GA) approach. The ANN model deals with estimating the mean and standard deviation of an objective performance. The design procedure is given in this paper and illustrated by the case study, which is to optimize a peaks function. In addition to the discussion of the sample preparation, the optimal ANN topology, and essential ANN parameters, comparison of the use of the GA optimization based on the developed ANN against the nonlinear programming and the best worst case is illustrated. The results show that the optimization using the ANN model performs well on different aspects.

Design and Implementation of a Lean Six Sigma Framework for Process Improvement: a Case Study

Tarak Shahada¹, Imad Alsyouf¹

 1 University of Sharjah, United Arab Emirates

The purpose of this paper is to develop a Lean Six Sigma framework according to the Six Sigma systemic process improvement methodology; Define, Measure, Analyze, Improve and Control (DMAIC). It was implemented and verified at one engineering company in UAE. The results show that the process "Make-to-Order (MTO) projects" has a long lead-time. The main causes of the long lead-time are the subcontractors, the customers, and the company-implemented procedures. Using the framework, it was possible to identify the most significant reason for the long lead-time, analyze the root-cause(s), suggest three relevant solutions and select the most preferred one. Using the framework methodology the user will have a systematic approach for continues improvement. The originality of this methodology was evident in integrating and using tools related to lean-production, six-sigma, balanced scorecard, simulation and cost benefit analysis. The framework allows the user identify the process problem(s) and solve them effectively.

In-Service Inspection of Static Mechanical Equipment on Offshore Oil and Gas Production Plants: A Decision Support Framework

A.M.N.D.B. Seneviratne¹, R.M. Chandima Ratnayake¹

¹University of Stavanger, Norway

Inspection and maintenance decisions are key elements for assuring the technical integrity of oil and gas (O&G) production plants. In this context, the offshore industry is facing a challenge in replacing experienced personnel with new recruitments. The issue is further exacerbated when the job responsibilities involve high risk related decisions. Therefore, it is important to replace the human involvement in decision making processes with intelligent systems.

The methods developed in operation research and/or the hybrid systems such as neurofuzzy methodologies provide a backbone for developing such systems. As the personnel working in the inspection planning deals with large amount of data from different data sources, it is vital to develop a mechanism to integrate these data to make the optimum decision. This paper proposes a framework for the mechanization of inspection planning and corresponding decision making processes, focusing on static mechanical equipment in offshore production plants.

Customer-Driven Conceptual Design for Mid-sized Passenger Aircraft

S.Y. Han¹, Hae-Jin Choi¹

¹Chung-Ang University, South Korea

Customer requirements used in the decision-making at early stage of design process is critically important but easily outdated in ever changing market places due to unstable global economic factors. These uncertain factors that have not been considered in a product design often negatively affect the product market performance at the time point of product introduction. To solve this critical problem, we propose a framework for strategic product design, in which designers may predict product market performance of their own product concepts at a targeted market and time with given levels of product attributes and predicted levels of economic factors. Conceptual design of mid-sized passenger aircraft is employed as a validation example in this work. Trends of customer preferences among three main aircraft attributes (number of seats, range, and speed) affected by oil price and interest rates are modeled based on historical sales data of existing aircraft models for 12 years.

Hybrid Fuzzy AHP-GA Approach to Supplier Selection and Order Allocation in SMEs Manufacturing Networks

Nan Li¹, Guiovanni Jules¹, Mozafar Saadat¹

¹University of Birmingham, United Kingdom

Supplier selection and order allocation is a key step in manufacturing process. Suitable suppliers for corresponding manufacturing tasks guarantee a good performance of company in terms of price, lead-time and quality etc. This paper proposes a hybrid approach to supplier selection and order allocation in Small-to-Medium sized enterprises (SMEs) manufacturing networks. Fuzzy Analytical Hierarchy process (FAHP) and Genetic Algorithms (GA) are applied to evaluate suppliers and optimize the combinations of suppliers. An industrial case study is carried out to collect the data and information from a central company which coordinates manufacturing networks of SMEs. CASE tool is constructed to simulate the supplier selection and order allocation process. Cost, Lead-time and Utilization score are used to quantify the results of optimization. Results show that the proposed system is able to optimize the manufacturing networks based on the requirements of customers and the performance of suppliers.

Evaluation Model For the Sustainable Use of Information Technology

Patricia Martins¹, Antonio Grilo¹

Faculdade de Ciências e Tecnologia da Universidade Nova de Lisboa, Portugal Research indicates that 2% of these emissions are caused by the information technology sector. The raise of ICT usage leads to the increase of energy consumption leading to a movement towards Green IT. While some companies are defending that sustainable practices are outside of their boundaries, others are taking green initiatives as a business value. This paper presents a decision model to support companies for the use of sustainable Information Technology, combining Fuzzy AHP and TOPSIS. Three cases studies were conducted in order to validate the applicability of the model. The perception of companies indicates that human behavior is the most important criteria for improving green usage of IT, and the sub-criteria related to prevent unnecessary printing of documents and concern about recycling obtaining the highest weights.

Session Operations Research (1)

Date Tue, 11 Dec Time 11:00 - 12:30

S222 Room

Chairs Kui Zhang, Shieu-Hong Lin

A Study on Adaptive Particle Swarm Optimization (APSO) for Solving Bi-level Job-shop Scheduling Problem

Chompoonoot Kasemset

¹Chiang Mai University, Thailand

This study presents a preliminary test of adaptive Particle Swarm Optimization (APSO) in solving the bi-level job-shop scheduling problem (JSP). The test problem presented here is 6x10 JSP (six jobs and ten machines) formulated as a bi-level formulation. APSO is used to solve the test problem and the result is compared with the result solved by PSO based method. The results of the test problem show that there is no significant difference in the first and second objective values and the iteration number in which the best solution is first identified between the solutions from APSO and existing PSO-based method in the tested small size problem of JSP. However, the advantage of APSO is that it can be used directly on new problem instances without the exercise to select parameters.

Optimization of the Annual Planning of Targeted Offers in Direct Marketing

Fabrice Talla Nobibon¹, Stephanie Delanote¹, Roel Leus¹

¹KU Leuven, Belgium

In this paper, we describe our development of an optimization model that captures the annual planning of producttargeting campaigns occurring in financial institutions. This model includes, on the one hand, product bundling to exploit complementarity among products, economies of scope and intensify customer lock-in, and on the other hand, multi-channeling to reach a sufficiently large public and enhance competitive strength. We perform extensive computational experiments on representative data sets and we discuss some strategic applications of the model. This work is based on a practical case, but all features identifying the company have been removed.

An Algorithm for the Sugar Cane Loading Station Location Problem

Wirekha Khamjan¹, Supachai Pathumnakul¹, Kullapapruk

Piewthongngam¹

¹Khon Kaen University, Thailand

In this paper, the problem of locating sugar cane loading station is addressed. The sugar cane loading station is the place for gathering sugar cane from small size fielders in remote areas. Then, the collected sugar cane is transported to sugar mill by the large size truck. An algorithm based on the relaxation of the mathematical model is developed to solve the problem. The objective function is to minimize total cost, which is the cost of enlarging the existing loading station, the cost of establishing new loading station, and the cost of transporting sugar cane from fields to loading stations and from loading stations to sugar mills. The results showed that the developed model provided solutions that are slightly different from optimal solution within short computation time.

A Variable Neighborhood Search Approach for Multiple Resources Constrained Parallel Machine Scheduling **Problem**

Zhengliang Hou¹, Xiuping Guo¹, Xiuli Guo²

¹Southwest Jiaotong University, China

²Xihua University, China

We developed a Variable Neighborhood Search approach (VNS) for the scheduling problem of minimizing makespan on identical parallel machines with multiple resources constraint and job sequence dependent setup times in this paper. Plenty number of instances were generated to verify the effectiveness of the proposed VNS. Computational experiences reveal that the proposed VNS outperformed Genetic Algorithm (GA) with respect to solution quality and time consumption.

A Mixed Integer Programming Formulation for Single Batch Processing Machine with Incompatible Job Families

Mohamed K. Omar¹, Yasothei Suppiah²
¹Nottingham University Business School, Malaysia

²Multimedia University, Malaysia

In this paper, we introduce a new mixed integer programming (MIP) formulation to address the sequencing problem of a single batch machine subject to family dependent setup times. The MIP developed here extends the current existing formulation in the literature by including the family setup time. The batches which are formed from jobs originating from incompatible families are then sequenced to minimize the total weighted tardiness. The MIP formulation has been tested on different combination of jobs, families and batch sizes for a total of 640 randomly generated instances with consideration of due date variance, percentage of tardy jobs and uniformly distributed setup times. The results indicate that the MIP can produce optimal solutions for all the problems tested.

Generating and Ordering of Transport Alternatives in Inter-Modal Logistics in the Presence of Cost, Time, and **Emission Conflicts**

Maria Kalinina¹, Aron Larsson², Leif Olsson³

¹Stockholm University, Sweden

²Mid Sweden University, Stockholm University, Sweden

³Mid Sweden University, Sweden

Intelligent matching of goods and freight transports is a complex task since different transport modes, such as trains, vessels and trucks have different strengths and weaknesses. Today, however, not only transport cost and time are considered but also the low emission is regarded as an important objective in intermodal freight logistics. The paper describes an approach for generating and ordering transports alternatives in the presence of cost, time, and emission conflicts. In order to obtain a reasonable ordering for generated alternatives we propose the use of the normalized Chebyshev distance between an alternative and a reference point, herein defined as a middle point. By doing so, preference information from a decision maker may be taken into account. The approach is tested on a medium sized problem. The results are promising and indicate the possibility of using the developed method in a decision support system.

An Optimization Model for Removal of Zinc from Industrial Wastewater

Farah Assadian¹, Pari Beirami¹

¹Islamic Azad University, Iran

Industrial wastewater is one of the crucial environmental concerns. Biosorption is an effective method used to remove toxic heavy metals from wastewater. Biosorption utilizes the capability of biomass to remove metal ions from wastewater. The determination of operating conditions, namely, the type and the amount of biomass to be used in the process as well as the processing time, are the key issues in the process. This paper proposes an optimization model for removal of zinc from wastewater. A biomass marine alga, Gracilaria Corticata (GC), is used as biosorbent. Derivation of zinc absorption kinetics model is first provided. A non-linear optimization model is then developed to determine the optimal operating conditions subject to satisfying a desired removal percentage while minimizing the total cost. The experimental results show that GC can be used well for zinc removal and the proposed optimization model can effectively reduce the process cost. The proposed approach is illustrated through a simplified numerical example.

Session Operations Research (2)

 Date
 Tue, 11 Dec

 Time
 13:30 - 15:00

 Room
 S222

Chairs Fabrice Talla Nobibon, Mingzhou Jin

Improving Business Process Performance Without Increasing Cost

Shin-Guang Chen¹

¹Tungnan University, Taiwan

This paper proposes a novel approach to improve the performance of a business process without increasing cost. A business process usually consists of multiple tasks connected by their precedence relationships. These tasks are done by some persons who may be normal, sick, or absent. Therefore, the performance of a business process is stochastic in nature, and it can be modeled by the stochastic flow network theory. In stochastic-flow network, the process performance is the probability that the maximal work flow is no less than the demand d. By this theory, the performance of a business process can be precisely measured under the state of each person. If each person in this process is trained as a all-around person, we can do an optimal person-job reassignment to get the optimal performance. Some examples are demonstrated for explanation of this approach.

Clustering and Hub Selection for a Large Scale Delivery Problem

Suyan Teng¹, Edmund Chan¹, Gabriel Siow² ¹Republic Polytechnic, Singapore ²ST Logistics Pte. Ltd., Singapore

In this paper, we propose a framework to decompose a large scale delivery problem into a number of smaller sub-problems to improve delivery efficiency and reduce cost. The delivery points were first classified into sectors according to Singapore Zones and Districts. Then, among a number of pre-selected candidate hubs, the decomposition problem considers how to determine the appropriate hubs among the candidates, and for each selected hub, how to determine the sectors that will get supply from the hub. The problem was formulated as a Binary Integer Programing (BIP) model and solved by IBM ILOG CPLEX Optimization Studio (ILOG OPL). Computational results show that, the prosed framework can obtain reasonably good results for clustering of the delivery points.

A Local-Search Based Algorithm for the Escherization Problem

Shinji Imahori¹, Shohei Sakai¹ ¹Nagoya University, Japan

A tiling of the plane is a set of figures, called tiles, that cover the plane without gaps or overlaps. On tiling we consider "Escherization problem": given a closed figure in the plane, find a new closed figure that is similar to the original and can tile the plane. Koizumi and Sugihara [2011, Maximum eigenvalue problem for Escherization, Graphs and Combinatorics 27, 431–439] reduced this problem to a maximum eigenvalue problem that can be solved easily. In this study, we propose a new method that combines local search with their method to improve the quality of solutions (output tiles) without manual operations. We conduct computational experiments with animal shape tiles to confirm the effectiveness of the proposed method.

Minimizing Total Tardiness in NFSSP with SDSTs and RDs by Using Hybrid Differential Evolution Algorithm

Bin Qian¹, Zuocheng Li¹, Rong Hu¹, Xiaohong Zhu¹ ¹Kunming University of Science and Technology, China

In this paper, a hybrid differential evolution algorithm (HDE) is developed for solving the no-wait flow shop scheduling problem (NFSSP) with sequence-dependent setup times (SDSTs) and release dates (RDs). The objective function to be minimized is total tardiness. Firstly, a largest-order-value (LOV) is utilized to convert continuous individuals in DE to job permutations. Secondly, differential evolution (DE) is used to evolve individuals in its population to execute effective exploration. Thirdly, a local search based on problem's properties and the insert neighborhood is embedded into DE to improve the exploitation ability. Due to the reasonable hybridization of exploration and exploitation, the NFSSP with SDSTs and RDs can be solved efficiently. Computational results show the effectiveness and efficiency of the proposed HDE.

Sequential Testing Policies for Complex Systems Under Precedence Constraints

Roel Leus¹, Wenchao Wei¹, Kris Coolen¹

¹KU Leuven, Belgium

We study the problem of sequentially testing the components of a multi-component system to learn the state of the system, when the tests are subject to precedence constraints and with the objective of minimizing the expected cost of the inspections. Our focus is on k-out-of-n systems, which function if at least k of the n components are functional. A solution is a testing policy, which is a set of decision rules that describe in which order to perform the tests. We distinguish two different classes of policies and describe exact algorithms (one branch-and bound algorithm and one dynamic program) to find an optimal member of each class. We report on extensive computational experiments with the algorithms for a representative data set.

Incorporating Local Search in Heuristics for Dynamic and Stochastic Maritime Pick-up and Delivery Problems

Gregorio Tirado¹, Lars Magnus Hvattum² ¹Universidad Complutense de Madrid, Spain

²Norwegian University of Science and Technology, Norway

This work considers a stochastic and dynamic routing problem arising in industrial shipping. Three existing solution methods are considered and extended by three different local search variations: a first improvement descent using stochastic information, a tabu search using stochastic information only when updating the incumbent solution, and a tabu search using stochastic information when selecting moves based on a list of moves determined through a proxy evaluation. The results emphasize the usefulness of incorporating stochastic information in solution methods for dynamic routing problems, and illustrates how structurally different solutions may arise from different methods even when similar stochastic information is used.

A Markov Decision-Making Model for Emergency Medical Resource Allocation with Multi-Category Injuries

Hongyun Xia¹, Yiping Jiang¹, Lindu Zhao¹, Micheal Herty²

¹Southeast University, China

²RWTH Aachen University, Germany

This paper focuses on the medical resource allocation problem in the context of demands great exceeding supplies. We first group the injuries as slight, moderate and severe classes. Then, we investigate the transitions of injuries' health states with delay consequence of medical service and with treatment by allocating medical resources respectively. Next, we formulate the transition process as a Markov Decision Process (MDP) model under the objective of maximizing life saving. Finally, we transfer the developed MDP model into a dynamic programming and propose an iteration algorithm to solve it. In the following, we give a numerical example to illustrate our model.

Session Operations Research (3)

Date Tue, 11 Dec Time 15:30 - 17:30 S222 Room

Chairs Jianfeng Mao, Lars Magnus Hvattum

Solving Euclidean Minimal Spanning Tree Problem Using a New Meta-heuristic Approach: Imperialist Competitive Algorithm (ICA)

S.Mohsen Hosseini¹, Abdullah Khaled¹, Mingzhou Jin²

¹Mississippi State University, United States

²The University of Tennessee, United States

The minimum spanning tree (MST) problem has numerous applications in design of communication, computer and transportation networks. This paper proposes an application of a new meta-heuristic called Imperialist Competitive algorithm (ICA) for solving a special case of MST defined on a Euclidean plane, called the Euclidean minimum spanning tree (EMST) problem. ICA is inspired by human's socio-political evolution. The solution quality and speed of the proposed are verified by numerical examples compared to a commercial optimization solver.

A New Construction Heuristic Algorithm for the Rectilinear Block Packing Problem: A Bridge between the **Best-Fit and Bottom-Left Algorithms**

Yannan Hu¹, Hideki Hashimoto¹, Shinji Imahori¹, Mutsunori Yagiura¹ ¹Nagoya University, Japan

The rectilinear block packing problem is a problem of packing a set of rectilinear blocks into a larger rectangular container, where a rectilinear block is a polygonal block whose interior angle is either 90 or 270 o. There exist many applications of this problem. In this paper, we propose a new construction heuristic algorithm based on the bottom-left strategy. The pro-posed algorithm is tested on a series of instances, which are generated from nine benchmark instances. The computational results show that the proposed algorithm is especially effective for large instances of the rectilinear block packing problem.

Vehicle Refueling Planning for Point-to-Point Delivery by **Motor Carriers**

Shieu-Hong Lin¹

¹Biola University, United States

Managing the fuel cost is a critical task for the transportation industry. For point-to-point delivery of commodity over the transportation network, the motor carrier needs a vehicle refueling plan that specifies (i) the path from the starting point to the destination, (ii) the intermediate stopping points for refueling along the path, and (iii) the amount of fuel to refill at each stopping point. Using the shortest path through the network may not end in the best result since fuel prices along the path may be more expensive than those along a longer path. We show that we can search for optimal vehicle refueling plans minimizing the total fuel cost by examining paths satisfying an extremal transition property and depict the resulting time complexity under several operational constraints.

Reformulation of Lawler's Algorithm by Auxiliary-information Dynamic Programming in a Minimax-cost Scheduling Problem

Eiji Mizutani¹

¹National Taiwan University of Science and Technology, Taiwan

We consider the minimax-cost scheduling problem, in which the objective is to obtain an optimal job sequence (on a single machine) that minimizes the worst stage cost. In the literature, the standard approach to the posed problem is an efficient backward sequencing procedure of Lawler 1973. It is in effect a greedy algorithm of Dijkstra type; this perspective allows us to reformulate Lawler's method as an equivalently efficient dynamic programming (DP) with auxiliary information. Our DP algorithm can terminate the process earlier than Lawler's procedure.

An Optimization Approach of Product Design with **Consumer Preference Uncertainty**

Jing Du¹, Xiaoming Hu¹, Qiang Lu¹, Suxiu Xu²

¹Harbin Institute of Technology Shenzhen Graduate School, China

²The University of Hong Kong, China

Product design optimization has traditionally been dealt with consumer preference as a deterministic process, such as conjoint analysis and multi-dimensional scaling. Actually, the hypothesis in those methods that consumer needs and preference are static and insulated is questioned by many marketing researchers. Preference dynamic and dependence suggest itself to be a challenging task. This paper reports an application of product design optimization capturing consumer preference uncertainty to laptop design. Preference dynamic character has been described as a Bayesian update process. Then, a generalized utility model is developed to facilitate the influence of preference dependence. To overcome the short of first-choice rule and probabilistic rule, a threshold-based choice rule is presented.

A Hybrid Algorithm for the Pickup and Delivery Problem with Time Windows: A Case Study at a Fresh Milk Plant

Mengjuan Xu1, Lindu Zhao1

¹Southeast University, China

This article addresses a vehicle routing problem which considers points requiring simultaneous pickup and delivery service in the given time windows. The objective of the problem is to determine the minimum costs both fixed and variable by means of a fleet of heterogeneous vehicles. We propose a hybrid algorithm which consists of a penalty function method and a tabu search algorithm. The first is to simplify the pickup and delivery problem with time windows (PDPTW). The latter improves solutions by limited iterations.

Enhanced Group Genetic Algorithm for the Heterogeneous Fixed Fleet Vehicle Routing Problem

Michael Mutingi¹, Charles Mbohwa²

¹University of Botswana, Botswana

²University of Johannesburg, South Africa

Vehicle routing is a crucial task in supply chain and logistics management. The heterogeneous fixed fleet vehicle routing problem (HFFVRP) has become a major optimization problem in most supply chains involved with delivery (collection) of goods to (from) customers. In this problem, there are limited vehicles of different types. The solution to this problem involves assigning customers to the existing vehicles and, in relation to each vehicle, defining the order of visiting each customer for the delivery or collection of goods. Hence, the objective is to minimize the total costs, while satisfying customer requirements and visiting each customer exactly once. In this paper an enhanced group genetic algorithm is proposed and tested on several benchmark problems. The computational results show that the proposed algorithm produces high quality solutions within an acceptable computation time.

Inventory Systems with Power Demand, Deterioration and **Backlogged Shortages**

Joaquin Sicilia-Rodriguez¹, Manuel Gonzalez-De la Rosa¹, Jaime

Febles-Acosta¹

¹University of La Laguna, Spain

In this paper we study deterministic inventory systems for goods with a power demand pattern. The inventory is depleted not only by demand but also by a deterioration process of items. A constant deterioration rate is assumed. Shortages are allowed and completely backlogged. The total inventory cost includes the ordering cost, the holding cost, the backlogging cost and the deteriorated units cost. A procedure to calculate the economic order quantity, the optimal length of the inventory cycle and the minimum inventory cost is proposed.

Session Supply Chain Management (1)

 Date
 Tue, 11 Dec

 Time
 11:00 - 12:30

 Room
 S223

Chairs Hongyi Sun, Horst Tempelmeier

Identify Critical Success Factor of Knowledge Management in Supply Chain: Fuzzy DEMATEL Approach

Sachin Patil¹, R. Kant¹

¹Sardar Vallabhbhai National Institute of Technology, India

Knowledge management (KM) is a major enabler of supply chain (SC) management. The performance of KM in SC may be affected by various different factors and it is always difficult for the practitioners to improve all aspects at the same time. This study presents a favorable method combining fuzzy set theory and the Decision-Making Trial and Evaluation Laboratory (DEMATEL) method to identify critical factors for successful KM implementations in SC. Considering the interdependence among factors, this fuzzy DEMATEL method forms a structural model and then visualizes the causal relationships among factors through a cause-effect relationship diagram. Then according to the results of proposed method, critical success factor (CSF) of KM in SC is figured out. Finally, four CSFs are identified out of 12 influencing factors, which will helps to improve effectiveness and efficiency of KM in SC.

A Predictive Model For Supply Chain Management Implementation Using AHP Methodology

Shrikant Gorane¹, R. Kant¹

¹Sardar Vallabhbhai National Institute of Technology, India

The aim of this paper is to understand of Supply chain management enablers (SCMEs) and to identify priority weights. It uses analytic hierarchy process (AHP) methodology to prioritize SCMEs for supporting the supply chain management (SCM) implementation in organizations. These SCMEs are selected form the literature reviews and expert discussion. The pair wise comparisons of SCMEs (usually, alternatives and attributes) are established using a scale indicating the strength with which one SCME dominates another with respect to higher-level SCMEs. This scaling process then translated into priority weights. The AHP can be a useful guide in the decision making process of SCM implementation. It has been observed that SCME 6 (top management commitment and support) has high priority weights. If the enablers with higher priority weights are properly concentrated during implementation, definitely the SCM implementation will be a success.

Predicting the Success Possibility of Implementing Information Sharing in Supply Chain Using Consistent Fuzzy Preference Relationship

R. Kant¹, Akshay Pujara¹

¹Sardar Vallabhbhai National Institute of Technology, India

The aim of this paper is to identify the priority weights of Information sharing Enablers (ISEs) in Supply Chain (SC). These ISEs are selected form the literature reviews and expert discussion. Consistent Fuzzy Preference Relationship (CFPR) is used to prioritize these ISEs for supporting effective information sharing (IS) in SC. The pair wise comparisons of ISEs are established using a scale indicating the strength by which one ISEs dominates another with respect to higher-level ISEs. This scaling process is then translated into priority weights. The CFPR can give clear idea for prioritizing the variable which has significant effect on effective IS in SC. It has been found that ISE 1 (top management commitment) has highest priority weights. If ISEs with higher priority weights are properly controlled during implementation, effective IS is easy to attain.

Myopic Multi-Period Mean-Variance Inventory Policy for Fashion Products

Tsan-Ming Choi¹

¹The Hong Kong Polytechnic University, Hong Kong

Inventory decision for fashion products with stochastic demand incurs risk. It is hence highly important to incorporate risk into the respective inventory decision making framework. By employing the mean-variance (MV) approach, this conference paper explores a myopic MV inventory policy for fashionable items with highly volatile demand. With the consideration of current wealth and the future (expected) profit target, we derive the closed-form optimal myopic inventory policy. We prove analytically that for any period

the optimal myopic ordering quantity decreases (or non-increases) when the on-hand wealth increases. When the on-hand wealth is very large, the retailer may give up ordering at the later periods. Moreover, for any period if the expected profit target increases, the retailer will order a bigger quantity. Future research directions are discussed.

Managing Health Care Perishable Apparel Products using Quick Response Program

Hau Ling Chan¹, Tsan-Ming Choi¹, Chi Leung Hui¹, Sau Fun Ng¹

The Hong Kong Polytechnic University, Hong Kong
With the similar characteristics as many fashion products, it is
believed that some health care apparel products can be managed by
Quick Response Program (QRP). Motivated by our real world
observations in local hospitals, we consider in this conference paper
that a private hospital can capture the demand of the correlated
products through a RFID or a bar-coding system to improve the
initial demand predication which leads to better inventory planning.
We develop an analytical Bayesian model for information updating
process. We derive the expected value of information acquisition and
examine whether QRP should be executed. We conclude that the
hospital should compare the ratio of the optimal number of
observations and the corresponding information acquisition costs to

Application of the Supply Chain Concept for Educational Services

determine which scanning system should be implemented.

Chiu Liang Gan¹, Ek Peng Chew¹, Loo Hay Lee¹
¹National University of Singapore, Singapore

Calls were made to review higher educational institutions' accountability for its outputs, in terms of affordability, accessibility, capacity and relevancy of graduates, and also to address the increased demand for knowledge workers with differentiated attributes. This paper proposes a management model that adopts the principle of the traditional supply chain to address this issue. The proposed model differs from the previous few studies of applied supply chain concepts into the management of the implied uncertainties inherent in the education system. By redefining the output in terms of graduates' employability attributes, output products (graduates) can then be differentiated, which in turn resulted in how the upstream drivers should be identified, labeled and managed. This exploratory paper proposes a supply chain model which can directly address the link between employability parameters and how the institutional resources are managed.

A Reverse Logistics Decision Model in Green Manufacturing Supply Chains

Tyrone T. Lin¹, Y.S. Lu¹

¹National Dong Hwa University, Taiwan

For the reason that people pay attention to green consciousness this year, this paper focus on the green logistics. We use the reverse logistics to explain how to deal with the green logistics. Besides, we use the net present value (NPV) to evaluate costs. At last, we will use an option model to prove our issue. From our research, first, we can know how a company sets the reasonable price. Second, we offer a green logistics model that help companies to do green logistics. Last, we help companies know well the green costs in manufacturing industries. There is no conflict between green logistics and profits if we can make use of the reverse logistics and analyze our costs in detail.

Session Supply Chain Management (2)

Date Tue, 11 Dec Time 13:30 - 15:00 S223 Room

Chairs Aron Larsson, Supachart Iamratanakul

A Thinking Framework for Managing Complexity in the Supply Chain

Seyda SerdarAsan¹

¹Istanbul Technical University, Turkey

Supply chains involve situations that are complex, messy, and that cannot be independent of the people involved (such as stakeholders with shared interests, yet with different worldviews and with possibly conflicting perceptions about the problem). In this kind of situations use of interpretive approaches (i.e. soft OR) that facilitate structuring the problem and provide a thinking framework that helps people to share a common language and understanding of the situation/system may produce more effective results. This, in turn, enables people to master the complexity they face in their supply chains more effectively. This paper presents a framework of supply chain complexity management and a methodology based on Theory of Constraints' Thinking Process Tools to support decision makers when dealing with complexity in the supply chain.

Capacitated Multi-Item Dynamic Lotsizing with Random Demand

Horst Tempelmeier¹

¹University of Cologne, Germany

In this paper a new formulation of the multi-item dynamic capacitated lotsizing problem with random demands and different types of service level constraints is presented. The model can be solved with a standard MIP-solver. For larger problem sizes, MIP-based heuristics are proposed.

Developing a Genetic Algorithm to Optimise an International Supply Chain under (s, S) policy

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

This paper considers an integrated raw material procurement and production planning problem in an international supply chain. The international supply chain is extracted from a real case study, which involves multiple stages with multiple types of uncertainties. The raw material procurement and production decisions are managed under set of (s, S) policies. The objective is to find the best set of the control parameters by optimising the supply chain performance. A genetic algorithm is developed. We compare the optimised policy with other policies including lot-for-lot policy and the company's original policy. The results show that a significant performance improvement can be achieved in various scenarios with different levels of uncertainty and international sales.

Micro-organizational Supply Chain Management Influential Factors: A Case Study

Nayanapriya Gunawardhana¹, Takao Enkawa¹, Sadami Suzuki¹

¹Tokyo Institute of Technology, Japan The paper proposes a 'Hierarchical Model for Supply Chain Management (SCM)' with a micro organizational demand chain perspective. Business model', 'product-market strategy', 'strategic management' and 'product complexity' are defined as broad influential factors in the model. A case study with six demand chains in the apparel industry illustrates the proposed model with an initial validation.

Quantifying Supply Chain Disruption Risk Using VaR

Allan Nengsheng Zhang¹, S.M. Wagner², Mark Goh³, M. Terhorst⁴, B. Ma¹ ¹Singapore Institute of Manufacturing Technology, Singapore

²Swiss Federal Institute of Technology, Switzerland

³TLI-AP,National University of Singapore, Singapore

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Supply chain disruptions now seem to happen more frequently and with more serious consequences. Measuring this risk is still an emerging topic for both research and practice. This paper presents a new quantitative method for risk measurement using Value at Risk (VaR) based on a disruption recovery model consisting of abrupt, normal, fast, and slow modes to help supply chain managers conduct robust "what-if" analyses to tackle such vulnerability and other risk factors for their company's business continuity. Unlike conventional applications of VaR that directly measure the risk in terms of the loss from a structural perspective, which is difficult for supply chain disruption risk, this paper introduces Time Equivalent derived from the recovery modes as a main measure to easily calculate the VaR for supply chain disruption risks.

Incentive Contracts between Fourth-party and Third-party **Logistics Providers based on Performance Measurement** with Intellectual Capital

Qin Zhu1, Richard Y. K. Fung1

¹City University of Hong Kong, Hong Kong

Recent development in logistics has led to wide use of fourth-party logistics (4PL) and third-party logistics (3PL) service providers. Given the increase of the supply chain complexity and growth of customer expectation, these logistics service providers (LSPs) face increasing challenges. A viable way is to cooperate. This paper aims to apply the principal-agent theory to study the horizontal cooperation between 4PL and 3PL providers through the use of incentive contracts. In contrast with traditional approach, intellectual capital such as employee knowledge and advanced information technology is added into the nosiness performance measurement. The intellectual capital is difficult to be measured in financial terms for contracting purpose, but can be reflected by a performance indicator. Issues related to the concept, definition and design of a sequence of short-period incentive contracts are discussed in this paper, as well as the role of the performance indicator.

Session Supply Chain Management (3)

 Date
 Tue, 11 Dec

 Time
 15:30 - 17:30

 Room
 S223

Chairs Allan Nengsheng Zhang, Fikri Dweiri

Container Pre-marshalling Problem: A Review and Solution Framework

Mohamed Gheith¹, Amr Eltawil¹, Nermine Harraz¹ ¹Egypt - Japan University of Science and Technology, Egypt

The continuously increasing trends of global trade are putting more emphasis on container terminals related operational problems. These problems are becoming day after day of extreme importance, and ever improving performance has become a demand for all container terminals. The container pre-marshalling problem is one of the important and hard to make decisions in modern container terminals that has a direct impact on vessel berthing times and hence on the performance of the container terminal. In this paper we provide a review of recent literature and we propose an innovative simple heuristic.

Multi-Depot Vehicle Routing Problem with Time Windows Using Hybrid Metaheuristic Algorithm

Seyed Farid Ghannadpour¹, Amin Jamili¹

¹MAPNA Co., Iran

This paper aims to presents a new solution for multi-depot vehicle routing problem with time windows which is well known combinatorial optimization problem in operation research. This problem involves the routing of a set of vehicles with limited capacity from a set of depots to a set of geographically dispersed customers with known demands and predefined time windows. The present work aims at using a hybrid metaheuristic algorithm in the class of High-Level Relay Hybrid (HRH) which works in three levels and uses an efficient genetic algorithm as the main optimization algorithm and tabu search as an improvement method. In the genetic algorithm various heuristics incorporate local exploitation in the evolutionary search. The suggestive algorithm is applied to solve the problems of the standard Cordeau's Instances. Results show that suggestive approach is quiet effective, as it provides solutions that are competitive with the best known in the literature.

A Three Echelons Supply Chain Network Design in a Fuzzy Environment Considering Inequality Constraints

Mahdi Bashiri¹, Mahtab Sherafati ¹

¹Shahed University, Iran

In this paper an optimization approach is applied for designing a multi-product supply chain network in a fuzzy environment. The considered supply chain contains three echelons of suppliers, manufacturers and retailers. In this problem a fuzzy optimization method has been used and fuzzy slack or surplus variables are used in optimization stage. In this paper the decision variables are fuzzy while in the other approach they are certain. Two hypothetical case studies illustrate the application of the proposed method. Finally a sensitivity analysis has been done for the fuzziness and its effect on the supply chain network design has been evaluated. The results show that increasing the fuzziness will increase the total cost and extra allocations will be added to the supply chain network structure.

The Study of Tiered Pricing Model in Three-echelon Reverse Supply Chain

Fuwen Li¹, Ruizhu Han¹
¹Southeast University, China

This paper studies the recycling and pricing problem of three-echelon reverse supply chain which is composed by a single manufacturer, a single third-party recycler and a single retailer. Under the premise that the recycled products have different quality levels, this paper uses game theory to discuss the tiered pricing strategies of the three-echelon reverse supply chain in the decentralized pricing model and in the centralized pricing model. Through analysis we obtain the Stackelberg equilibrium in the decentralized decision-making mode and the equilibrium solution in the centralized decision-making mode. Finally, a numerical example further illustrates the conclusion that the recycling price of the waste products and reverse supply chain profit in the centralized pricing model are higher than the corresponding results in the decentralized pricing model.

Coordinating a Supply Chain for a Newsvendor-Type Product with Sales Effort Effects

Yao Yu Wang¹, Jian-Cai Wang² ¹Soochow University, China ²Beijing Institute of Technology, China

In this paper, we investigate the issue of how to coordinate a supply chain for a newsvendor-type product where demand is sensitive to both retail price and sales effort. Most related studies have shown that many of the well-known "channel coordination" contracts will fail in such a with-effort supply chain. To remedy this situation, we propose a continuous "volume discount" schedule which not only can perfectly coordinate this with-effort channel, but also enables the dominant manufacturer to arbitrarily allocate the channel profit and leave only a subsistence profit for the retailer.

Strategic Design of the Construction Supply Chain: A Case of Building Projects in Iran

Mohammad Reza Safaian¹, Hossein Moradinasab¹

¹Building Engineering Organization, Iran

Supply chain management (SCM) is a concept that has flourished in manufacturing. Strategic management of the construction project can be achieved by implementing the supply chain management approach. 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 were conducted with the experienced Iranian practitioners. 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 strategic management in the actual construction project.

Matching of Intermodal Freight Transports Using Optimization in a Decision Support System

Leif Olsson¹, Aron Larsson²

¹Mid Sweden University, Sweden

²Mid Sweden University, Stockholm University, Sweden

We describe the computational methods to be used in a web based transport matching system in order to providing clients alternative transport routes, and a model for support of combined intermodal transports where time, emissions and costs are jointly handled. We use network optimization and a mixed integer linear model together with subsequent results from a feasibility test carried out within a transport corridor ranging from the west coast of Norway to Finland through Sweden. The test indicates that network optimization is a well suited methodology for this type of problem, providing swift solutions for the selected problem which is of a medium size with respect to the network size. Future development will be focused on the extension and implementation of this model in a web-based multi-criteria decision support system, able to handle conflicts between cost, time, and emissions in the recommendation of admissible transport solutions.

A Classification and Review of Recent Models for Solving the Vehicle Routing Problem and a Proposed New Problem Framework

Alyaa Abdel-Halim¹, Amr Eltawil¹

¹Egypt - Japan University of Science and Technology, Egypt

The exponential rise in the advances of computing power has opened new domains for improved solution quality and computational efficiency for more difficult classes of the Vehicle Routing Problems (VRP). This paper sheds some light on the recent work published in this field of interest and provides a classification of different problem structures and the solution methodologies used to tackle every class. Waste collection is then identified as a one of the current critical applications of the VRP, the problem is reviewed and a new class is identified and described.

Session Quality Control & Management (1)

Date Tue, 11 Dec Time 11:00 - 12:30 S224 Room

Chairs Ralph Riedel, Sandeep Grover

Critical Success Factors for Six Sigma Deployment: Is a Centralized Deployment Structure Better Than a Re-integrated Deployment Structure?

Alan Keeley¹, Corro Van Waveren¹, Kai-Ying Chan¹

¹University of Pretoria, South Africa

The Six Sigma continuous improvement methodology often resulted in significant reduction in cost and increases in revenue. Lonmin PLC, which operates within the South African Mining Environment, decided to transform its Six Sigma deployment from a centralized centre of excellence approach to one where the core competencies and drive behind the deployment programme (black belts and master black belts) are re-integrated into the line functions of the organization. The aim of this paper is to determine which of the deployment structures is more successful and the success factors associated to the more successful deployment structure. The empirical results have showed a centralized deployment structure is more successful using dependent samples t-tests. Moreover, seven critical success factors are identified using multivariate analysis.

A Method for Product Quality Management Throughout Its Life Cycle

Dinh Son Nguyen¹

¹Danang University of Technology, The University of Danang, Viet Nam

Due to the development of information technology, computer is becoming a useful and effective tool to support engineering activities in product design and manufacturing. A numerical model of product created in CAD environment is used to perform engineering simulation such as kinematics, dynamics, failure, etc. However, it is a nominal representation of product and does not deal with variations generated along the product life cycle. The risk is then that the designed product does not fully meet the requirements of customers and users. Thus, this paper proposes a method that allows managing the quality of product during its life cycle. The method permits to model variation sources during the product life cycle and managing causes and consequences of these variations at design stage.

A Generalized Linear Test Model to Monitor AR(1) **Autocorrelated Polynomial Profiles**

M. Keramatpour¹, S.T.A. Niaki², Amirhossein Amiri³ ¹Islamic Azad University, Qazvin Branch, Iran ²Sharif University of Technology, Iran

³Shahed University, Iran

In some statistical process control applications, quality of a process or product can be characterized by a relationship between a response and one or more independent variables, which is typically referred to a profile. In this paper, polynomial profiles are considered where there is a first order autoregressive relation between the error terms in each profile. A remedial measure is first proposed to eliminate the effect of autocorrelation in phase-II monitoring of autocorrelated profiles. Then, a control chart based on the generalized linear test (GLT) is developed to monitor coefficients of polynomial profiles along with an R-chart to monitor the error variance, the combination of which is called GLT/R chart. Then, the results obtained from GLT/R charts are compared to the prevalent method like multivariate T2 control chart. Average run length criterion is employed to compare the performances.

Identifying the Time of a Step Change in the Mean of a **Two-Stage Process**

Amirhossein Amiri¹, S. Zolfaghari¹, Ali Asgari¹

¹Shahed University, Iran

when a control chart signals is not necessarily the real time of a change known as the change point in the literature. Estimating the real time of a change after a control chart signals is crucial and leads to saving time and cost in finding special causes. In this paper an MLE approach is used to estimate step change point in the mean of multistage process in Phase II. We specially focus on a two stage process each one including a variable quality characteristic with normal distribution. The quality characteristics in these two stages are linked to each other through a linear regression model. The performance of the proposed method is evaluated through a numerical example. The results show that the estimator performs well

An Empirical Study of Critical Success Factors for Statistical Process Control Implementation: A Second-Order Factor Analysis

Jafri Mohd Rohani¹, Sha'ri Mohd Yusof¹, Ismail Mohamad¹

¹Universiti Teknologi Malaysia, Malaysia

Very few empirical studies have been published on developing and validating key success factors for SPC implementation.. This study employs confirmatory factor analysis (CFA) and structural equation modelling (SEM) to investigate the presence of single second-order factors for analyzing key success factors. CFA was employed to validate the measurement model of six first-order factors. Based on CFA goodness-of-fit indices, the results provided evidence for the data fit the proposed model of 6-factor construct. Based on SEM analysis, these six first-order factors correlated positively and collectively load on a single second-order factor called "critical success factors". This new evidence suggest that SPC implementation should be viewed as a whole rather than piece meal approach.

Product Driven Quality Control

Samuel Bassetto¹, Adeline Motte¹

¹Polytechnique Montreal, Canada

Starting with the observation that a great number of defective products are released on the market, we wondered if product driven quality control (PDQC) could be more efficient to prevent such situations. To test this policy, we have built a job-shop manufacturing system using multi agents technology that enables products to be pro-active both for production and quality controls. In this system, each product is aware of its own quality and takes the initiative of quality measurements. PDQC has been systematically compared to classical frequency based quality control (FQC) policies. The results of the simulation show that there are less defective products in the case of PDQC and a better detection. However the level of uncertain products as the speed of detection are not influenced by this policy.

Quality Management for Leadership

Masayoshi Ushikubo¹, Hisato Tashiro², Nobuzumi Fujii³, Ichiro Sakata² ¹Sanden Corporation,

²The University of Tokyo, Japan

³Waseda University, Japan

Top management commitment is one of most essential factors for the success of Total Quality Management (TQM) implementation. Continuous supply of genuine leadership is critical for survival of the TQM organization. But, a little is known to raise enable leaders for next generation. In this paper, we review a literature of TQM and Leadership with a citation network. Then, discuss a model of leadership developed by a case global manufacturer that has been awarded various quality awards, including several Deming Application Prizes in Japan, Singapore, U.S.A. and India. Session Quality Control & Management (2)

Date Tue, 11 Dec Time 13:30 - 15:00 S224 Room

Chairs Huairui Guo, Charles Mbohwa

Nonparametric Design of Phase I X Control Charts with or without Sensitizing Run Rules

Giovanna Capizzi¹, Guido Masarotto¹

¹University of Padua, Italy

Shewhart X control charts are very popular between practitioners since they are easy to operate and interpret. Traditionally, the control limits for the standardized subgroup means are either fixed in advance or computed so that the chart has a prescribed probability of giving a false alarm for an in-control normal process. Both approaches can result in an excessive number of false alarms in the nonnormal scenario. Here, we argue in favor of determining control limits by permutation. The new critical values are fast to compute and guarantee a prescribed false alarm probability without any prior information on the in-control distribution. A simulation study shows that the proposed limits enjoy an oracle property; namely, they perform at least as well as if the true underlying process distribution were known in advance and used to compute the limits. An R package implementing the new procedure is available from the authors.

DMAIC Methodology for Fold Defect Reduction in the **Optical Blank Industry**

Mohamed K. Omar¹, Hock Kheng Sim², Geok Ching Lim²
¹Nottingham University Business School, Malaysia
²Multimedia University, Malaysia

This study presents a Six-Sigma project of a company in optical industry that has difficulties to screen the defect mold blanks. This project has substantially benefited the firm by reducing the defect rate and as a result; the customer's claims were reduced by 40.8%. This was done through statistical analysis; identifying the effects of the key process input variables (KPIVs) towards key process output variables (KPOVs). In addition, risk of the critical KPIVs was measured with FMEA, and selected KPIVs were used for process improvement. An optimal setting for the process was proposed. The proposed solution was tested and verified by simulation and successfully implemented in the company. This project methodology can be used in general to reduce process variations for other firms in the optical industry and can help to reduce the defect rates.

Evaluating Intensity of Human Factors in TQM Using Analytical Network Process (ANP) Approach

Sandeep Grover¹

¹YMCA University of Science & Technology, India

There are numerous benefits of successful implementation of Total Quality Management (TQM) in an organisation. Besides many critical factors affecting the TQM Implementation, the role of human resource factor is the most important. It is considered as a soft factor of an organisation. This paper focuses on the identification and analysis of various vital human factors influencing the successful implementation of TQM. Prioritization of the factors has been done with the Analytical Network Process (ANP), which is the extension of well-known technique Analytical Hierarchy Process (AHP) developed by Saaty. Whereas, AHP only considers the interrelationships at the outer level, ANP also evaluates the interrelationships at the inner level with the feedback. The resulting model formed by analytic network process can guide organizations to suitably prioritise the factors and emphasise them properly during the planning, installation and start-up phases of the implementation process. This methodology (ANP) has never been used to evaluate the human resource factors in TQM as author has not come across any literature on this.

Field Data Analysis in Truck Production - a Case Study

Ralph Riedel¹, Egon Mueller¹

¹Chemnitz University of Technology, Germany

The early detection of systematic failures is crucial to ascertain high product reliability, to continuously improve products and production processes and thereby to achieve a high level of customer satisfaction. Complex and global products lead to increased difficulties for field data analysis and product evaluation. In this paper we present an approach from the truck manufacturing industry to link field damage data to parameters of product

configuration and usage. The methodological concept is validated and its potential is proven by its application to several data samples from the field.

Barriers in Total Productive Maintenance Implementation in a Semiconductor Manufacturing Firm: A Case Study

Kam-Choi Ng1, Gerald Guan Gan Goh2, Uchenna Cyril Eze3

¹Infineon Technologies, Malaysia ²Multimedia University, Malaysia ³Monash University, Malaysia

As most organizations have to simultaneously meet various stakeholders requirements related to quality, cost, delivery and safety aspects these organizations must be driven by both effective and efficient operation strategies in order to fulfill the stakeholders' demand. One of the approaches to improve the production performance is to develop and implement total maintenance. Total productive maintenance (TPM) is a world-class manufacturing strategy which leading manufacturing very near to ideal condition with zero down time, zero defect, lean production, just-in-time production (JIT) and competitive cost leader in order to gain competitive advantage. The findings of this research reveal key barriers of a successful TPM implementation such as lack of long-term commitment from the top management, lack of competent resources, lack of buy-in from shop floor staff, increase production operator's job load, lack of cultural change, inability of the organization to coordinate its shop floor, and inadequate communication and awareness.

On Detection of Spatiotemporal Clustering

Chen-ju Lin¹, Yen-ting Chen¹

1Yuan Ze University, Taiwan

Timely detection of an event is one of the important tasks in many spatiotemporal applications. The unknown nature of the event makes the detection process challenging. Likelihood ratio (LR) methods have been widely used for identifying locations and change point times through searching the maximum evidence over temporal and spatial windows. However, the LR-based methods may not be optimal if shift parameters are unknown. This paper introduces a new test framework for spatiotemporal surveillance based on the EWMA technique. We propose a statistic that applies exponential smoothing to both temporal and spatial axes and aggregate spatiotemporal data in each scan window. The results show that the EWMA-based method could be more or less sensitive than the LR-based methods depending on the chosen smoothing parameter, size of scan window, underlying shift patterns and time of occurrence

The Role of Leadership Competencies for Implementing

Kem Ramdass

¹University of Johannesburg, South Africa

The current economic distress faced by many manufacturing companies in South Africa both large and small has forced the leadership to review business performance and implement measures to reduce costs across all levels. However, in a well-designed study exploring the attitudes and perceptions of senior executives to ISO 9000, Taylor [18] stated that the transition from concept to implementation of ISO 9000 is often where senior executives fail to provide the ISO 9000 initiative with adequate legitimacy, and fail to address the resource requirements, the potential benefits, the methods of measuring results and steps in the detailed planning process. The paper aims to determine what leadership competencies are required for ensuring commitment to implementing quality management systems and how the level of leadership competencies affects the extent of implementation of quality management principles through a questionnaire using a 5 point Likert scale.

Engineering Economy and Cost Analysis Session

Date Tue, 11 Dec Time 15:30 - 17:30 S224 Room

Chairs Linda Zhang, Jinghua Wang

Application of Robust Design Technique in SME Project Finance: A Case Study to Calculate Optimum Set-Points

R.M. Chandima Ratnayake¹, Harsha Jayatilaka²

¹University of Stavanger, Norway

²Kempe Engineering Services (Australia) Pty Ltd, Australia

Project finance (PF) has been a key area of concern in development-related lending institutions. The success of investments on a project depends on several factors and their levels at PF appraisal phase. A case study is carried out in collaboration with one of the regional development-related lending institutions to calculate the optimum set-points of control factors which affect the success of PF. Key control factors that influence the success of project financing were identified based on the inputs from the experienced PF personnel in the case study lending institution. Debt service cover ratio (DSCR) has been selected as a measure of projects' performance. The manuscript provides a methodology based on the robust design technique to calculate optimum set-points of controllable parameters concerning the PF for small and medium enterprises (SMEs). Also, the manuscript provides a verification experiment based on the identified optimum settings of the controllable factors.

Strategic Fit in Value Added Networks of Electric Vehicle Production

Achim Kampker¹, Peter Burggraf¹, Carsten Nee¹

¹University of Aachen, Germany

Electric vehicles are in direct competition with conventionally powered cars. However, high prices currently result in a moderate acceptance and low market penetration. Manufacturing companies have to attain new competencies in electric vehicle production as well as develop existing competencies at an early stage to be able to create attractive products for customers. The value chain of electric vehicle production requires cost and quality orientation as well as scalability of production processes for the value added network strategy. Nevertheless, designing value added networks for electric vehicle production follows no systematic approach to align the corporate strategies of network participants to the cooperative strategy of the network. Value added networks therefore lack a strategic fit among participants and common targets in terms of costs, quality and scalability.

Demand Response Mechanism and Simulation Research of Cold Storage Air Conditioner Supporting Consumption of the Onshore Wind Power

Yu Cheng¹, Su An¹

¹North China Electric Power University, China

Heavy cooling load can lead to a load gap during the day and a peak-load regulation problem during the night in the area with onshore wind power installed. Fortunately, cold storage air conditioner (CSAC) can be used as a effective demand response resource to absorb onshore wind power. This paper establishes a mixed cold storage air conditioner demand response price incentive mechanism, in order to promote wind power storage by cold storage system at night, and a response evaluation model of CSAC, in order to effectively track the executive effect under different incentive mechanisms. The simulation of the coastal areas with prominent air-conditioning load in summer shows that when we implement price incentive mechanism on CSAC, system load and cost of peak load regulation can effectively reduce, at the same time, wind power can obtain a good profit.

Managing the Economic Performance of Research-driven Initiatives in the Field of Transdisciplinary Research

Florian G. H. Behncke¹, Martina Wickel¹, Udo Lindemann¹

¹Technische Universitat Munchen, Germany

The economic performance determines the competitive position of a company. Companies providing product-service systems are challenged by the transdisciplinary character of derived initiatives. This aggravates the management of the economic performance of the different initiatives. Based on established approaches of performance management (Balanced Scorecard), the paper derives an enhanced economy framework for the management of the economic performance of research-driven initiatives in the field of transdisciplinary research.

The Optimal Allocation of the Investment Capital for R&D Projects at the Commercial Stage with the Kelly Criterion

Gyutai Kim¹

¹Chosun University, South Korea

Strategic investment projects such as research and development (R&D) projects generally require a huge amount of initial capital over a long period of time. To effectively manage them, project managers need to pay a careful and prudent attention on an economic justification process at the outset, especially the optimal allocation of the investment resources on them. In this paper, we propose the methodology to determine the optimal ratio of investment capital in the R&D projects. The methodology is established based on the Kelly criterion combined together with real options valuing (ROV) theories for the commercial stage of the R&D projects.

Research on Life Cycle Management of Nuclear Power Plant equipment based on Economic Analysis

Kai-kai Gu¹, Jiang Guo¹, Ming-shu Fan¹, Ke-fei Zhang¹, Lei Shi¹ ¹Wuhan University, China

Instead of constructing new nuclear power plant, nuclear power has been shifted to expand the lifetime of nuclear power plant according to the condition of safety and reliability around the world. In order to achieve the goal of life extension, it is important for the nuclear power plants to focus on the life cycle management of critical equipment. LEA (Life Economic Analysis), the core work of life cycle management, is an analysis strategy to improve the usability of critical equipment and achieve the maximization of life value and long period of revenue through optimizing decision-making process of critical equipment. In this paper, a calculation method of the equipment failure rate based on the three-parameter Weibull distribution model is given. Ensuring the premise of reliability and safety, the economic analysis of the model is proposed to optimize the cost. Finally, based on the model of economic analysis, the paper takes an equipment of 60-year life cycle management as an example to verify the feasibility of the economic analysis model.

Injection Mold Replacement Analysis in Automotive Industry

Tanasak Suwannabool¹, Daricha Sutivong¹

¹Chulalongkorn University, Thailand

Injection mold replacement decisions in the automotive industry are usually made by managers and engineers, who based primarily on their own experience. This paper presents an injection mold replacement analysis through the use of stochastic dynamic programming and benchmark from the case study. The algorithm determines a optimal production volume and age that give the minimum expected cost under time constraint. The solutions are presented as a decision chart for easy application and interpretation.

Service Provision, Subsidies and Revenue Maximization in **Multitier Communities**

Hailing Zhu1, Mbuyu Sumbwanyambe1, Andre L Nel1

¹University of Johannesburg, South Africa

One of the main aims of institutional frameworks of developing countries is to increase universal access to Information and Communications Technologies (ICT) services through subsidized communication services. However, subsidies may have severe consequences on service provision and revenue maximization. This phenomenon calls for a combined study to investigate the relationship between service provision, subsidy and revenue maximization in the presence of user heterogeneity. In this paper, we consider a situation, in which the non-subsidized users and subsidized users share the same network. Furthermore, we propose a differentiated service model coupled with a subsidy driven pricing scheme that will effectively fulfill government objectives of universal access while maximizing revenue for the USO ISPs. We show that, by taking into account how the users value the subsidized service, the proposed service differentiation system can achieve an effective network utilization and prevent the tragedy of the commons.

Session Production Planning & Control (1)

Date Tue, 11 Dec Time 11:00 - 12:30 S225 Room

Chairs Akihiko Nagai, Junqiang Wang

Constructing Generic Processes based on Tree Unification for Process Family Planning

Linda Zhang¹

¹IESEG School of Management, France

Planning process families in relation to product families has been well recognized as a promising approach to achieving production stability and efficiency, where diverse customized products are involved. As with generic products accommodating product family design, generic processes facilitate process family planning in producing the corresponding product families. In view of the fact that a production process is commonly represented as a tree, this paper puts forward an approach based on tree unification to construct generic processes from large volumes of data existing in companies' databases. The preliminary results of applying the proposed approach to electronic products have demonstrated the feasibility and potential of constructing generic processes based on tree unification.

Batch Optimization Algorithm for Autoclave Curing of **Fiber-Reinforced Composites**

Tobias Philipp¹, Thorsten Klein¹, Gunther Reinhart¹ ¹Technische Universitaet Muenchen, Germany

Composite materials in terms of fiberreinforced plastics (FRP) are used as lightweight materials in various products for example airplanes or helicopters. The manufacturing of high performance carbon fiberreinforced plastic (CFRP) parts in the aeronautics industry often relies on preimpregnated fibers (prepregs) which are cured in an autoclave. In this context, the production output mainly is determined by the autoclave being a bottleneck in production. To address this issue, we present a novel approach to model a batch optimization problem in the context of composites manufacturing and then introduce a batch optimization algorithm based on the principle of a genetic algorithm. Furthermore, a simulation study, which is used to assess the performance of the proposed algorithm, is described.

Approach for an RFID-based Situational Shop Floor

Philipp Engelhardt¹, Gunther Reinhart¹ ¹Technische Universität München, Germany

Manufacturing companies act in a turbulent environment, which is caused by the global shift from seller markets to buyer markets. The production is characterized by a high variety and the demand for short delivery times. In this context, shop floor control becomes more and more important. However, current shop floor information, which is indispensable for a targeted execution of the purposes of shop floor control, is often not available. The RFID (Radio Frequency Identification) technology enables an adequate and situational shop floor control. For that reason, this article describes an approach that enhances for a systematical configuration and a situation-dependent execution of an RFID-based situational shop floor control.

21st Century Operational Excellence: Addressing the Similarities and Differences between Lean Production, **Agility and ORM**

Daryl Powell¹, Jan Ola Strandhagen¹

¹Norwegian University of Science and Technology, Norway

For many years companies have attempted to improve their manufacturing operations in a view to achieving Operational Excellence. As such, several models for Operational Excellence have been constructed, particularly the Shingo Prize. However, such models are very much focused on the approach and working practices associated with Lean Production and JIT. As the global market place evolves, consumers are demanding more customized products with shorter life cycles. This has introduced an array of challenges for the producers that were once able to benefit from JIT production of high volume, low-variety products. In this paper, we review literature on developments in Lean and Operational Excellence in order to develop a framework for 21st Century Operational Excellence, in which we integrate elements from the Quick Response Manufacturing- and Agile Manufacturing paradigms with the Lean movement. We illustrate the applicability of our framework with the use of practical insights from three case

Operations Scheduling in Make-and-Pack Production: Schedule Construction and GA-based Priority-Rule **Generation Procedures**

Philipp Baumann¹, Norbert Trautmann¹ ¹University of Bern, Switzerland

Make-and-pack production processes are vital to, e.g., the consumer industry or the pharmaceutical industry. Production facilities used for such processes can be divided into a make stage, a pack stage, and a set of storage tanks which decouple the two stages. In operations scheduling, complex technological constraints must then be considered, e.g., non-identical parallel processing units, sequence-dependent changeovers, batch splitting, material transfer times, minimum storage times, and finite storage capacity. In this paper, we present an effective and generic heuristic for operations scheduling in such production processes. The heuristic consists of a genetic algorithm for generating priority rules which are used to sort the operations to be scheduled, and a scheme for scheduling the operations in the devised order. Our computational results for a make-and-pack production process from the consumer industry indicate that this heuristic outperforms the state-of-the-art solution methods.

Modeling the Master Production Scheduling System with Downgraded Products for a TFT-LCD Module Factory Chun-Cheng Lin¹, Jia-Rong Kang¹, Wan-Yu Liu², Shu-Hsing Chung¹,

Kai-Shin Chou1

¹National Chiao Tung University, Taiwan

²Aletheia University, Taiwan

At the end processes of TFT-LCD supply chain, the LCM module factory takes charge of the process of assembling products, and its production planning needs to consider various products with different graded TFT-LCD panels while meeting customers' specific qualifications, including lowest acceptance rates for quality and zero-bad-defect quantity. Since the machine setup time of the bottleneck workstation in the factory is very long, it is of practical importance to design an appropriate production scheduling with concerns about times of machine setups and different grades of TFT-LCD products. This paper proposes a production scheduling system that comprises the material planning with downgraded products as well as the bottleneck scheduling for a LCM module factory using make-to-stock production, and solves the system based on integer programming. Experimental results show that the system not only is capable of reducing the number of setup times, but also performs well in efficiency of preparing critical materials. From a practical aspect, such a system can support production managers to plan their production scheduling effectively.

Session Production Planning & Control (2)

Date Tue, 11 Dec Time 13:30 - 15:00 S225 Room

Chairs Carman Ka Man Lee, Chang Liu

New Entropy Weight-Based TOPSIS for Evaluation of Multi-objective Job-Shop Scheduling Solutions

Junqiang Wang¹, Jian Chen¹, Ting Qu², George Huang², Yingfeng Zhang¹, Shudong Sun¹

¹Northwestern Polytechnical University, China

²The University of Hong Kong, Hong Kong

Facing with an obtained set of Pareto solutions on multi-objective job-shop scheduling problems, its core issue is how to evaluate the best-compromise solution from these non-dominated solutions for decision maker. TOPSIS as a multi-criteria decision making method is introduced into the evaluation of these Pareto solutions. The traditional Entropy weight approach used to calculate the weights of each criterion fails to faithfully transform the information from the Entropy value to Entropy weight, and an abrupt change of Entropy weight arises while facing with a very slight change of Entropy values when these Entropy values are close to 1. To address them, a new transformation formula from the Entropy value to Entropy weight is proposed to not only heritage the originally good performance but also make up the existing deficiency. Finally, the result of an illustrated example shows that the feasibility and accuracy of the proposed approach.

An Artificial Immune Based Algorithm for Parallel-machine Scheduling with Preference of Machines

Ching-Jen Huang¹, Li-Man Liao¹

¹National Chin-Yi University of Technology, Taiwan

In this paper, an artificial immune based algorithm (AIA) is proposed for production scheduling of aluminum foil factory. The objective function is to minimize the total tardiness. The AIA algorithm has a systematic immune mechanism which mainly is built on the clonal selection and affinity maturation principles of the immune system. Machine-based encoding method is used and earliest due date (EDD) rule is applied to find the better initial antibodies. The antibodies are then separated into memory or suppressive cells by affinity, and the suppressive cells will be eliminated based on the concentration level. Further, crossover and mutation techniques are used to construct antibody proliferation mechanism to obtain superior antibodies. To avoid falling into local optimal solutions, receptor editing mechanism is applied to suppress the worse antibodies and accelerate solution convergence.

A Multi-Agent Based Rescheduling Framework for Mixed-Model Assembly Line Balancing

Li-Man Liao¹, Ching-Jen Huang¹

¹National Chin-Yi University of Technology, Taiwan

In general, company responds to customers' diversified needs, the necessity to make production system more versatile and flexible. The assembly line must change from fixed assembly lines to mixed-model assembly lines (MMAL). Because an assembly line is dynamic, and when system disturbance occur, rescheduling is necessary to adjust or regenerate an effective feasible schedule. For maximizing the productivity of the dynamical MMAL, the paper develops a decentralized framework using multi-agent system to reschedule MMAL balancing problem when unexpected disturbance occurred. A three-level multi-agent system is constructive, and integrates dispatching rule and meta-heuristic techniques. In scheduling stage, two criteria are simultaneously considered for optimization: to minimize the number of workstation for a given cycle time, and to maximize the workload smoothing. In each rescheduling stage, schedule is generated using a meta-heuristic that allows two objectives, efficiency and stability, to be balanced.

A Finite Economic Production Quantity Model with Two **Imperfect Modules**

Dah-Chuan Gong¹, Gary C. Lin², Kai-Xun Zhuang³, Pei-Han Lee³ ¹Chung Yuan Christian University, Taiwan, National University of Singapore,

²Bradley University, United States

³Chung Yuan Christian University, Taiwan

In this paper, we consider an Economic Production Quantity (EPQ) model where items are manufactured at an imperfect production system over a finite planning horizon. During a production run, the production system is dictated by two unreliable key modules (KMs) that may shift from an in-control state to an out-of-control state due to three independent sources of shocks. Four states O, A, B, and AB represent the changes either before or after the occurrences of these shocks. State O means both KMs are in-control. Contrarily, state AB means both KMs are out-of-control. Once a key module shifts to an out-of-control state, certain amount of defects will be generated. A mathematical model is developed to react to the above situations. The concerned objective is to find the number of production runs that minimize the expected total costs consisting of setup, holding, and defective costs.

The Significance of Serendipity in New Market Creation

Akihiko Nagai¹, Takayuki Ito¹

¹Nagoya Institute of Technology, Japan

The word serendipity means the accidental finding of potential or invisible needs without looking for them. In case studies, serendipity created new markets. Potential needs is exposed only part of like an iceberg. To obtain business opportunities, business creators must uncover the buried potential needs. If an entrepreneurial business creator can fully uncover potential needs, this will lead to opportunities for new market creation.

Combined Economic and Emission Dispatch Using Harmony Search and Genetic Algorithm

Yun-Chia Liang¹, Josue Cuevas¹

¹Yuan Ze University, Taiwan

The difficulty incurred when solving the Economic and Emission dispatch (ED/MED) problems increases when the combined version (CEED) of the two aforementioned cases is considered. In this paper a new approach for solving the CEED is proposed, where a normalization of the objective function prevents units and scale differences between the ED and MED. The mathematical model is optimized using two well-known meta-heuristics, Genetic Algorithm (GA) and Harmony Search (HS). A nonlinear optimization tool for MATLAB (TOMLAB) is used to confirm the efficiency and effectiveness of the proposed algorithms. Three approaches are compared when solving the ED, MED and the CEED, where a comprehensive statistical study is performed. From the test instance, it was observed that the proposed method shows to be feasible, and also helps the algorithms in optimizing the CEED problem achieving a result that is close from that coming when solving the ED and MED separately.

Session Production Planning & Control (3)

Date Tue, 11 Dec Time 15:30 - 17:30 S225 Room

Chairs Dah-Chuan Gong, Yun-Chia Liang

Research on Dynamic Dispatching Rule for Semiconductor Assembly Production Line

Chang Liu¹, Hai-Zan Chen², Yuan Rong³, Jun Zhu²

¹Wuxi CAS Ubiquitous Information Technology R&D center Co.Ltd,Shenyang

Institute of Automation, China ²Chinese Academy of Sciences, China

³Massachusetts Institute of Technology, United States

We propose a dynamic dispatching rule for semiconductor assembly production line based on the current mainstream dynamic dispatching rules. In particular, our dispatching rule considers batch dispatching. Evaluated through simulation, we confirmed the effectiveness of this dispatching rule and provided additional operational insights for actual production system.

A Data Envelopment Analysis Approach to Resource **Efficiency Evaluation**

Jenny Xu¹, Šiddharth Goutam¹, Xun Xu¹, Shane Xie¹

¹University of Auckland, New Zealand

Resource efficiency is an important factor to consider in resource management and production planning. This paper extends on the system framework introduced in our previous work and outlines a Data Envelopment Analysis based approach for resource efficiency evaluation. The concept of Decision Making Units (DMUs) is applied to manufacturing resources and the efficiency of a DMU is measured relative to similar DMUs in order to estimate the best practice frontier. This approach allows management to gain a better understanding of the relative performing efficiencies of their resources and helps them to facilitate necessary training actions and optimize resource utilization. A case study is carried out in industry to validate the performance of the proposed efficiency evaluation method.

Simulation Aided Disturbance Management in One-of-a-kind Production on the Assembly Site

Robert Wandt¹, Axel Friedewald¹, Hermann Lödding

¹Hamburg University of Technology, Germany

Organizing one-of-a-kind production (OKP) at assembly sites is always a big challenge, especially in shipbuilding industry due to the high complexity of the product and the large number of different parts. In manufacturing, various types of uncertainties and disruptions influence production planning, scheduling and control in daily operations. This paper presents a concept for analyzing and managing disturbances in a systematic way. The method combines process simulation and Virtual Reality in one business process and thus helps a planner to choose the best adjustment of the production plan to deal with a disturbance. Testing the concept by simulating different disturbance scenarios shows a promising impact of the concept in managing these. The presented concept is capable of dealing with disturbances in the complex field of organizing OKP production. It decreases the necessary effort dealing with these and helps the planner.

Solving the Problem of Product-Conversion in Semiconductor Assembly and Test Manufacturing System by a Novel Heuristic Scheduling Algorithm

Li-li Yao¹, Hai-bo Shi², Chang Liu² ¹Graduate University of the Chinese Academy of Sciences, Shenyang Institute of Automation, CAS, China

²Wuxi CAS Ubiquitous Information Technology R&D center Co.Ltd, Shenyang Institute of Automation, China

In this paper, a novel heuristic scheduling algorithm is proposed to solve the problem of product conversion in semiconductor assembly and test manufacturing (ATM) system. The phenomenon of product-conversion is frequent and takes a lot of time in ATM enterprise. In order to reduce the frequency of product-conversion and minimize the conversion time in product-conversion station, the novel algorithm has predicted and limited the number of the permissible assigned machines for each type of products according to the processing conditions before scheduling; and takes processing conditions as the priority principle of assignment in the follow-up process; in addition, the algorithm sets up a decision-making mechanism when the machine should convert the product. Finally, comparing the algorithm with two traditional methods, the results show that the scheduling using the novel algorithm has an obvious advantage, it improves the utilization rate of equipment and productiveness.

Deterministic Joint Replenishment Problem with Multiple Restriction: A Lagrangian Relaxation Approach

Amit Kumar Gupta¹, R R K Sharma¹

¹Indian Institute of Technology Kanpur, India

The joint replenishment problem (JRP) is about deciding the replenishment cycle and the lot size of each item in a multi-item scenario so that the sum total of inventory carrying cost and ordering cost (major and minor) is minimized. The existing research is mostly confined to development of Algorithms, heuristics and bounds on basic replenishment cycle time for the classical JRP. Very few works are available on the JRP with constraints like capacity (storage and production), capital, and so forth. In this paper we have developed an efficient Lagrangian based heuristic for providing a good solution to the JRP with the constraints on storage capacity and capital investment on each item. We have found that our proposed algorithm gives a better solution compared to the best known method reported in the literature.

Optimization of Manufacturing Planning and Control Systems in Highly Dynamic Environments using Bernoulli Theorem

Johannes Mapokgole¹, Tengen Thomas¹

¹Vaal University of Technology, South Africa

In any dynamic manufacturing enterprise, production is the driving force or element to which other critical functions react upon. Among other elements, inventory exists because of the needs of production. Manufacturing systems are known for their unevenness production flow between workstations that results in bottleneck operations. Bernoulli's principle is employed to address situation like production bottlenecks. This delineates the relationship between manufacturing control and available capacities. Existing manufacturing planning and control framework is analyzed and a new framework is proposed that gives attention to decisions with respect to the aggregation and abstraction of information on resources, orders, etc. Proposed framework serves as a starting point during production scheduling activities. Unlike Bernoulli's principle, this study proves that the slower the rate of production flow, the lower the pressure, and the faster the rate of production flow, the higher the pressure.

A Multi-Crop Production Planning Model for Hydroponic Systems With Nutrient Mix Reusability

Haniel Chua¹, Francis Ramirez¹, Kyle Sy¹, Dennis Cruz¹

¹De La Salle University, Philippines

Hydroponics is a more efficient and sustainable method to the growing food production problems. Its benefits include a faster harvest, significantly more yield, and food can be grown in nonarable. However, the main challenge is to establish and maintain a commercial hydroponic system large enough to significantly produce food given that it is technically difficult and very costly, with nutrient costs identified as the largest cost contributor. Using GAMS, a commercial hydroponic system, expensive and technical, is optimized; the output in the form of a production schedule for the operators, gives ease in implementation. With the results, the significant variables were identified as the nutrient expiration, table capacity, and the weight increment of crops. Using the model algorithm, the system shows a total cost reduction by 32.17%. With the significant reduction in cost, it makes food production for urban areas a possible reality and a significant step toward sustainable agriculture.

Bi-objective Simulated Annealing and Adaptive Memory Procedure Approaches to Solve a Hybrid Flow Shop Scheduling Problem with Unrelated Parallel Machines

Hmid Mohammadi¹, Rashed Sahraeian¹

¹Shahed University, Iran

In this paper, a novel hybrid flow shop scheduling problem with respect to the both objectives of total setup time and cost is investigated. Since the problem is NP-hard, we focus on suboptimal scheduling solutions for the hybrid flow shop with unrelated parallel machines, sequence and machine-dependent setup time, eligibility constraint and release time. In this research, total sequence and machine dependent setup time and cost are used as the objective functions. We present a multi-objective simulated annealing (MOSA) and an adaptive memory procedure (MOAMP) in order to find a set of non-dominated solutions. The problem solved with different number of jobs and stages using MOSA and MOAMP algorithms. Computational results showed that the proposed MOAMP approach is more effective and efficient than the simulated annealing algorithm in terms of reduced setup criterions for the attempted problem.

Manufacturing Systems (1) Session

Date Tue, 11 Dec Time 11:00 - 12:30 S226 Room

Chairs Jiping Lu, Muthu Mathirajan

A Multi-objective Biogeography-based Optimization for Mixed-model Two-sided Assembly Line Balancing with a **Learning Effect**

Ronnachai Sirovetnukul¹, Uamporn Jansame², Parames Chutima² ¹Mahidol University, Thailand

²Chulalongkorn University, Thailand

The biogeography-based optimization (BBO) algorithm is applied to a mixed-model two-sided assembly line balancing problem with a learning effect (M2SALB-L) of type 1 to optimize multi-objectives including minimize the number of mated stations, minimize the number of workstations, minimize work relatedness and minimize workload variation between workstations. The results demonstrate clearly that BBO with local search (BBO-LS) is a rival algorithm to solve this problem on multi-objective performance measures. Due to the local search the CPU times of BBO-LS are greater than BBO and Discrete Particle Swarm Optimization (DPSO), but are significantly less than Non-dominated Sorting Genetic Algorithm-II (NSGA-II).

The Study Wood Furniture Which Made of Fast Growing Wood Specie of Azadirachta exceisa (Jack) Jacobs. for Wood Industrial Standard by Finite Element and Design **Analysis of Experiments**

Sakkarin Choodoung¹, Chalermpon Buttard¹

¹King Mongkut's University of Technology North Bangkok, Thailand

This study is the research in application of finite element analysis program in Neem-Wood (Azadirachta exceisa (Jack) Jacobs.) furniture testing for industry standard which is the cost reduction in manufacturing process and testing standard under destructive approach. This study begins with Neem-Wood joint testing as a study case then continued with design and develop of sample Neem-Wood furniture with finite element analysis. After that, the study produced the sample furniture with Neem-Wood for strength test then performs a comparative analysis with both results. The study result indicates that the test of wooden pivot making of Neem-Wood as a study case shows appropriate strength for using in furniture manufacturing. Therefore, wooden pivot length in Neem-Wood joint significantly affects strength with 95% confidence. For strength analysis after finished as furniture, the finite element result shows the same result as destructive testing for export standard. In conclusion, this study can apply finite element analysis with strength test leading to standardized furniture manufacturing.

Analysis of Assembly Sequence for Effective Assembly Plan of Wooden Furniture

Sakkarin Choodoung¹, Uttapol Smutkupt²

¹King Mongkut's University of Technology North Bangkok, Thailand

²Chiang Mai University, Thailand

This study aims to design and develop a tool to find an appropriate assembly sequence plan for wooden furniture industry. According to the research result, the wooden furniture has different process of assembly than other industry such as glue applying, feeding and fitting, glue pressuring and excessive glue removing. Moreover, there are 2 crucial time period which are open assembly time and close assembly time. In addition, open assembly time should less than 2-3 minutes but will be 1-1.5 hours for close assembly time depending on glue components and wood type. Thus, the traditional analysis using individual part insertion is extremely unsuitable. As a consequence, this study created a chart table to help planning sequence of assembly. The chart table provides properness level of a assembly sequence. Moreover, the study has developed and/or graph which is able to appropriately analyze multiple parts combination in some of assembly sequence.

Robustness of Assemble-to-Order Systems against **Unexpected Events**

Henri Tokola¹, Esko Niemi¹

¹Aalto University, Finland

This paper studies the robustness of different ATO systems against unexpected events occurring without any prior knowledge of them, after the components have been ordered. The unexpected events considered are changes in demand, the loss of a component, and a production limit. A single-event assemble-to-order model with the

probability of a link between each product and each component is used to study the impact of the events. The costs are calculated for each of the events when there is either a product with a high shortage cost or a component with a high holding cost. These costs are used in an example to show how different events yield different costs in different ways in a sparse or in a dense ATO network. The combination of component loss with a demand increase gives typically the highest costs when it is compared to other events.

The Role of Total Productive Maintenance in Manufacturing Firms: A Review

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

In any manufacturing firm, machine and equipment should be operating at full capacity all the times. Total productive maintenance (TPM) is a well known and very useful approach, which allows manufacturing firms to attain near ideal conditions with zero downtime, zero defects and zero accident. One of the approaches to improve the production performance is to develop and implement total productive maintenance, which is an excellent manufacturing strategy that holds the potential for improvements in overall equipment effectiveness (OEE). The main findings of a review of the extant literature reveal key contributions and effectiveness of successful TPM implementation such as improved equipment efficiency, improved overall operation cost, improved overall equipment effectiveness and equipment throughput, improved product quality, improved organization performances, improved teamwork across cross functional areas, improved plant productivity, improves production 5S, reduced equipment breakdown and improved equipment availability can be realized by firms.

Critical Success Factors for MES Implementation in China

Huasheng Yang¹, Li Zheng¹, Yi Huang¹ ¹Tsinghua University, China

Manufacturing execution system (MES) is becoming more and more important nowadays and more and more manufacturing enterprises in China are adopting MES. Hence, to improve the success rate of MES implementation is critical for enterprise. However, the study of this topic is still at the nascent stage and many firms find it difficult to implement MES effectively, especially they cannot make sure the implementing success. The paper examines relevant literature to identify the special critical successful factors (CSF) in MES implementation in China, based on Chinese special culture and the characteristics of MIS implementation in China which are quite different from those in western countries.

How Dose Product Innovation Help New Firm Growth: The Moderating Effects of Knowledge from Demand Side and Business Environment

Chaoqun Zhang¹, Xiaobo Wu¹

¹Zhejiang University, China

Product innovation is of great importance to new firms. However, there is no a consensus on its effects on firm performance. In this paper, we introduce two kinds of approaches to tackle this issue. One is decomposing the construct of new product. The other one is introducing contingent factors, including technical and application knowledge from demand side and environmental factors. Our results are a series of propositions upon these considerations.

Manufacturing Systems (2) Session

Date Tue, 11 Dec Time 13:30 - 15:00 S226

Room

Ronnachai Sirovetnukul, Jiping Lu Chairs

Reconfigurable Mixed Model Assembly Line Design in a **Dynamic Production Environment**

Dida Damayanti¹, Isa Setiasyah Toha² ¹Telkom Institute of Technology, Indonesia ²Bandung Institute of Technology, Indonesia

A mixed model assembly line is generally designed to produce a certain production mixed and volume that is assumed to be steady for a long period. As a result, the line performance tends to decline by some fluctuations in production demand. In a dynamic production environment, an assembly line configuration and product sequence may need to be revised every time the demand changes to keep the line efficient. However, frequent or radical reconfiguration of the line could be costly; the change of the line configuration and product sequence should be optimized. This paper presents a model of a reconfigurable mixed model assembly line design in a dynamic production environment. The model is formulated in a non linear integer programming formulation that minimizes total cost of assembly line reconfiguration for a multiple-period. Numerical example of the model shows the application of the model and yields a reconfigurable mixed model assembly line.

Deconstructing Emerging Business Ecosystems: Explorations of the Chinese Electric Vehicle Industry

Tianjiao Shang¹, Yongjiang Shi¹ ¹University of Cambridge, United Kingdom

The purpose of this research paper is to extend business ecosystem theories into the emerging industries, through conducting multiple case studies with firms along the supply chain of the Chinese Electric Vehicle Industry, as well as the policy makers and associated industrial players. The constructive elements of the emerging EV business ecosystem have been identified, such that the business ecosystem is divided into four sub-sections: 1)Supply, 2) Interface, 3) Demand, and 4) Support. Theoretically, this paper has contributed by enriching Moore's Business ecosystem. In Practice, this research is able to shed light for industrial players in providing a comprehensive picture of the overall ecosystem that they are situated in, which would allow them to gain a deeper understanding of the macro milieu that often impact their businesses significantly.

A New Decision Making Approach for the Formation of Holonic Agent-based Manufacturing Networks

Guiovanni Jules¹, Mozafar Saadat¹, Nan Li¹

¹University of Birmingham, United Kingdom

The research paper presents the methodology used to develop decision algorithms for order holons. Two algorithms are presented in this paper. The algorithms model an actual job allocation system and a conceptual one for the formation of networks of manufacturers. The first algorithm is derived from an industrial case study. The second algorithm exploits the use of multiple flexibility parameters to improve the performance of the job allocation system on quality, cost and delivery time. Multi-agent system (MAS) and discrete event simulation constitute the methodology which allows the two algorithms to be run in a verified and validated environment. The results of the simulation show that the second algorithm outperforms the first algorithm on network conformance reliability, production cost and order delivery times. Eventually, the methodology will be developed to test the algorithms in the market conditions of a volatile environment.

The Hybrid Manufacturing Cell: Determining Key Parameters in the Integration of Powder Bed Fusion with **High Speed Milling**

Vegard Brotan¹, Klas Magnus Bovie² ¹Norwegian University of Science and Technology , Norway ²SINTEF Raufoss Manufacturing AS, Norway

Additive manufacturing (AM) technology is highly efficient for producing complex object geometries such as bespoke lattice structures or internal channelization in the product. However the principle of building objects by the successive addition of material makes the production of large and massive objects time consuming, and therefore also an expensive operation. For metallic materials, this

limitation can be avoided by combining AM of the complex sections of the product with traditional high-speed machining of the more massive and geometrically simple sections into a hybrid manufacturing solution. However, hybrid manufacturing is a complex process, and there are several crucial points that have to be under control in order to receive the full benefits of an integrated functionality. This paper presents a method to determine the key variables and constants necessary for the integration of a powder bed fusion machine with a high-speed milling machine into a hybrid manufacturing cell.

Linking Strategic Goals with Operational Performance: An **Integrated Approach**

Antonio Almeida¹, Daniel Politze², Alvaro Caldas¹, Americo Azevedo¹ ¹INESC TEC, Faculdade de Engenharia da Universidade do Porto, Portugal ²ETH Zurich, Switzerland

Due to the increasing globalization and the current economic situation, the power has shifted from the producer to the costumer, which forces companies to become more aware of market needs. To capitalize business opportunities, manufacturing organizations need to improve their business processes and operations in order to become more flexible, manage shorter product life cycles and thus please their customers by continuously adapting to meet the needs and expectations of the market.

Hence, in order to gain competitive advantage, decision makers have become increasingly interested in investing in new approaches capable of supporting companies so that they can integrate strategic and operational perspectives. The aim is for them to be able to control their production systems in a more proactive way.

Therefore, this paper intends to explore a new integrated strategic performance management approach, capable of supporting organizations in achieving World-Class Manufacturing Excellence in a more proactive way.

Performance Modeling of Reconfigurable Manufacturing System for Different Dispatching Strategies Under Exception

Faisal Hasan¹, P.K Jain¹, Dinesh Kumar¹ ¹Indian Institute of Technology Roorkee, India

The paper presents the performance modeling of a hybrid system like RMS comprising of dedicated and reconfigurable machines. The modeling focuses on handling of exceptional situations which arises when there is a breakdown of any resource within the system. The dedicated machines are subjected to random failures, upon failure the jobs are transferred to the reconfigurable machines after suitable reconfiguration to carry out the sequential operation required on the job. Two different production scenarios, first, operation of the system over some predetermined period of time and, secondly, operation of the system for a fixed quantity of products were simulated. Three different dispatching strategies for reactive scheduling of parts based on total average waiting time in queue, total downtime of the failed machine and capacity of the buffer between the machines were analyzed. The performance of the system was analyzed in terms of productivity, congestion and make-span time.

Reactive Scheduling for Non-disruptive Job Processing **Against Machine Breakdowns**

Wan-Ling Li¹, Muhammed Hafidz Fazli¹, Tomohiro Murata¹
¹Waseda University, Japan

This paper proposes a novel mathematical model for reallocation of pending jobs and dynamic scheduling to maintain the productivity of cellular manufacturing (CM) under machine breakdowns. In real world, manufacturing systems may face unexpected machine breakdowns; however, they must be required to fulfill varied production targets in each production period. This paper presents effectively reactive scheduling has the ability to recently overcome performance deterioration factor that is the critical problem. Numerical experiments are presented to demonstrate the effectiveness of the proposed model by applying it to CM problems of unexpected machine breakdowns.

Manufacturing Systems (3) Session

Date Tue, 11 Dec Time 15:30 - 17:30 S226 Room

Chairs Yong-Zai Lu, Ronnachai Sirovetnukul

The Robust Scheduling Solutions for Parallel Machine Systems Under an Uncertain Environment

Xuanhao Zhou¹, Yong-Zai Lu¹ ¹Zhejiang University, Čhina

While making decisions under uncertainty, min-max regret criteria is widely used to evaluate the robust characteristic of solutions for many combinatorial optimization problems. Particularly in the field of scheduling, R. Montemanni et al. first investigates a version of single machine scheduling problem where one type of uncertainty, namely the uncertain processing times for each job specified as a range of possible values, is taken into account. In this paper, we first extend that idea to the parallel machines case which is more significant to the production industries but also more difficult to handle due to its complexity characteristic. To address it, the robust parallel machine schedule model with objective to minimize maximal robust deviation on the total flow time is proposed here. Meanwhile, we provide an efficient preprocessing procedure to boost the speed of optimization. Computational results are finally presented to show the validity of this method.

Study on the Layered Predictive Control Algorithm for the Main Steam Temperature of Ultra-supercritical Units

Shihe Chen¹, Wenkai Hu², Xin Li² ¹Guangdong Electric Power Research Institute, China ²Wuhan University, China

Aiming at the main steam temperature control problem of ultra-supercritical units under variable loads conditions, a predictive PID control algorithm with layered structure is proposed. The cascade PID control is applied in the lower circuit which can realize the application in DCS system through configuration language programming. The generalized predictive optimization is applied in the upper circuit which is used to conduct PID parameter setting instead of control engineers. By introducing least square method with forgetting factor recursive, the model parameter identification in rolling window is realized and the PID parameters tuning optimization model with predictive index is established. The simulation results show that the proposed algorithm can adapt to the model change process of the controlled object of main steam temperature and is qualified with strong stability and robustness.

Optimization of Power Station Boiler Coal Mill Output Based on the Particle Swarm Algorithm

Yanjun Fang¹, Xiaojie Qin¹, Yuan Fang¹

¹Wuhan University, China

For the rapid response of coal mill to output changes in the case of ultra-supercritical units frequently changing load, in this paper, a coal mill output optimization model has been proposed and an improved PSO algorithm has been optimized. The state of start and stop of coal mill and operation combination have been obtained when the unit loads change through simulation. The obtained start-stop combination of coal mill can meet the basic requirements of the coal mill output when the unit runs, which thus has decreased the energy consumption in the case of the coal mill low output and improved the efficiency of the coal mill. The result of this paper can adapt to changes of peak load regulation unit peakload regulation unit and has a great promotional value.

Lean Manufacturing in Textile Industry of Pakistan

Ali Husnain Rabbani¹, Muhammad Asim²

National University of Sciences and Technology, Pakistan ²Center For Advanced Studies In Engineering, Pakistan

The objective of this research is to analyze how much lean manufacturing techniques are implemented in the textile industry of Pakistan. Our sample includes the textile mills of Pakistan in Rawalpindi/ Islamabad and Rahim Yar Khan Region. We conducted surveys through questionnaires, taking the sample size of 70 which involves the the owners/managing directors, senior management and employees in the textile mills. Correlation analysis was done to find the relationship between lean manufacturing and the dimensions. The results show that the Pakistani textile mills have not fully adopted lean practices. There is need to create more awareness regarding benefits of lean manufacturing among textile mills. This

paper will help to do further research regarding the causes of failure in adopting lean practices in textile mills of Pakistan.

Scheduling a BPM with Incompatible Job-Families and **Dynamic Job-Arrivals**

Muthu Mathirajan¹, M Vimalarani¹ ¹Indian Institute of Science, India

This study addresses the scheduling of a diffusion furnace, a Batch Processing Machine (BPM) with dynamic job-arrivals, and incompatible job-families with the objective of minimizing total weighted tardiness (TWT). Due to the computational intractability, a few variants, based on the EDD, CR, ST, and different versions of ATC dispatching rules, of a greedy heuristic method (GHM) are proposed. A series of computational experiments carried-out indicated that one of the variant of the ATC rule has excellent performance in comparison with an estimated optimal solution.

Characteristic Simulation of High Pressure Common Rail Pipe

Jiping Lu¹, Fan Hongli¹, Wang Lianhong², Song Hao¹, Pan Yong¹ Beijing Institute of Technology, China

²China North Engine Research Institute, China

A simulation model of high pressure common rail system is established based on FLUENT. By setting up the appropriate boundary conditions, in which the standard turbulence model and the SIMPLE algorithm are selected. The paper simulates and analyzes that how the structural parameters of the rail pipe, including slip size, chamfer at the cross-hole, and wall roughness, affect the hydraulic stability of the rail pipe. The simulation results provide the theoretical basis for the design of the high-pressure common rail.

Integration of Sustainability and Mass Customization: Proposal of a Framework to Map Research Open Issues

Golboo Pourabdollahian¹, Mahnoosh Zebardast¹, Marco Taisch¹ ¹Politecnico di Milano, Italy

Mass customization as one of the solutions for recent market requests for individualized products and sustainability as one of the necessities driven by international and local pressure along with recent individuals' awareness create this perception that in near future an enterprise should be able to follow both concepts concurrently to be competitive. Accordingly this study initiates to investigate more in depth the competitiveness of firms through the paradigm known as sustainable mass customization by developing a research framework to elicit open issues of this novel paradigm. The current research is based on a broad literature review on both topics trying to highlight required research directions for successful implementation of sustainable mass customization.

Deciphering Business Ecosystem Capabilities of the **Emerging Electric Vehicle Industry**

Tianjiao Shang¹, Feifan Chang¹, Yongjiang Shi¹

"University of Cambridge, United Kingdom
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The aim of this paper is to propose a comprehensive research framework seeking to decipher the evolutionary development of emerging business ecosystems and to identify the necessary strategic capabilities which enable the transformation of business ecosystems from one stage to the next along its life-cycle. Initial findings from exploratory case studies of the EV industry in Chinese Shandong Province show that the EV Business ecosystem emerged from a network of connected entrepreneurs to its current nascent structure. Taking a multi-disciplinary approach, literatures of evolutionary economics, business ecosystem and capabilities have been reviewed. On the basis of the research gaps, a conceptual research framework is proposed that potential contributions of subsequent findings include theoretically enriching business ecosystem theories and benefiting industrial players practically through the formulation of the capability maturity model.

Session Technology and Knowledge Management (1)

 Date
 Tue, 11 Dec

 Time
 11:00 - 12:30

 Room
 S227

Chairs Lin Gong, Matti Karvonen

Effective Wi-Fi Setting User Experience Design by Using Systematic Innovation Method

Song-Kyoo Kim¹

¹Asian Institute of Management, Philippines

Wireless Fidelity allows electronic devices to exchange data wirelessly over a computer network. The feature is applied most of mobile devices. The paper deals with the practical approach of technology enhancement by using the unique problem solving method. Systematic innovation is a structured process and set of practical tools that can be used for value creation. The user experience enhancement for Wi-Fi usage is designed based on human behaviors by using the innovative method.

Making Mergers More Effective Through Technology Management

Murali Krishna Kuppili¹, Ramachandra Aryasri²¹SoCtronics Technologies Pvt. Ltd., India²JNTU, India

This paper focuses on challenges faced in bringing two semiconductor companies under merger to a common technological platform and strategic solutions implemented to make the merger successful. A case study approach is followed to review and analyze the results. From the study, a 15% reduction was observed in the product development cycle. These savings were mainly due to efficient implementation of strategies to bring both the teams in common technology platform. From this paper one can understand better in the context of semiconductor industry the concepts of technology management its impact on product schedules & financials. The strategic solutions & benefits indicated here will help organizations just after merger, to take appropriate actions in technology management. This paper will assist future researchers to explore more ideas as there is limited research & literature available on this topic.

A Study on the Job Satisfaction of Governmental Labor Inspectors in Taiwan

Fu-Man Hsieh¹, Yichun Yu², Y.C. Lin², P.-J. Tsai³

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²Institute of Occupational Safety and Health, Taiwan

³China Medical University, Taiwan

This study was to investigate the contents of core competences and their training demands for industrial safety and hygiene professional engineers (ISHPEs). The contents of 7 core and 35 sub-core competences were developed for conducting field surveys to safety and health managers (SHMs) respectively from both high-tech and traditional industries. Both the "deficiency" of ISHPEs and the "importance" of each investigated sub-core competence were assessed using a 5-point Likert scale. We found that 9 out of 35, and 13 out of 35 sub-core competences were "high deficiency" and "high importance", respectively. For training demands, results show that 16 and 14 sub-core competences were determined as "high training demand" for ISHPEs based on judgments made by SHMs of the high-tech and traditional industry, respectively. Among them, 13 were consistently identified by SHMs of the both types should be considered the first priority subjects for conducting on-the-job trainings for ISHPEs.

Interpretive Structural Model of Key Performance Indicators for Sustainable Manufacturing Evaluation in Automotive Companies

Automotive Companies Elita Amrina¹, Sha'ri Mohd Yusof² ¹Andalas University, Indonesia ²Universiti Teknologi Malaysia, Malaysia

This paper aims to analyze the interrelationships among the key performance indicators of sustainable manufacturing evaluation in automotive companies. The initial key performance indicators have been identified and derived from literature and were then validated by industry survey. Interpretive structural modeling (ISM) methodology is applied to develop a hierarchical structure of the key performance indicators in three levels. Of nine indicators, there are five unstable indicators which have both high driver and dependence power, thus requiring further attention. It is believed that the model can provide a better insight for automotive managers in assessing their sustainable manufacturing performance.

How to Use the Big Data to the Technology Planning: A Data-Driven Technology Roadmapping Using ARM

Youngjung Geum¹, Hyeonjeong Lee¹, Yongtae Park¹

¹Seoul National University, South Korea

Due to the rise of big data, the active incorporation of data becomes a vital process in the technology roadmap. However, technology roadmapping still remains as a subjective task conducted by experts. Especially, the identification of relationship among layers has been dependent upon intuitive judgments of experts. Some previous research, albeit infrequent, has attempted rather scientific approach but yet has been subject to limitations in that it remains as simply calculating the occurrence for keywords. However, what is required is to identify the dependency between layers. In response, this paper suggests an association rule mining (ARM)-based technology roadmap to provide both the affinity and dependency among layers. For this purpose, two types of indexes - support and confidence- are measured and corresponding maps are developed: affinity map and dependency map. For the intra-layer relationship, the affinity map is developed whereas the dependency map is constructed for the inter-layer relationship.

E-service Concept Design in Recombinative Innovation: A Morphology Analysis Approach

Jieun Kim¹, Yongtae Park¹

¹Seoul National University, South Korea

Recently, recombinative innovation is one of the most highlighted issues in e-service area. Although previous research, albeit scanty, focused on technical perspectives in substantial development, a conceptual design of recombinative e-service has been scarcely studied. Since recombinative e-service involves multiple elements of sources and design parameters, and the combination of those elements, a combinative tool is appropriate and even indispensable to conceptual design. Thus, this paper suggests a morphological analysis approach to identify multiple means of conceptual design and consider multiple conceptual designs by decomposition and combination. First, source and parameter dictionary is constructed by decomposing existing sources and services. Second, a recombinative morphology is developed by integrating the values of dimensions in dictionary. Finally, new e-service concept is identified by matching the configurations with existing services.

Session Technology and Knowledge Management (2)

 Date
 Tue, 11 Dec

 Time
 13:30 - 15:00

 Room
 S227

Chairs Tritos Laosirihongthong, Ching-Yu Lien

Locating the Key Competitors: A New Tool for Technology Manager

Chung-Huei Kuan¹, Mu-Hsuan Huang², Dar-Zen Chen²

¹National Taiwan University of Science and Technology, Taiwan

²National Taiwan University, Taiwan

We propose to use the product of a competitor's h-index and a weighted sum of the citations of its h-core patents as a Core Value characterizing the competitor's h-core performance in terms of both quality and quantity. The key competitors are those of the greatest Core Values. The approach is applied to empirical data and compared with similar measures such as the products of the h-index and other h-type indices. The approach obviates the insensitivity problem to exceptionally highly cited patents and does not impose significant analytical overhead to the technology manager.

Leadership as a Determinant of Product Innovation: a Systematic Review of the Literature

Tharnpas Sattayaraksa¹, Sakun Boon-itt²

¹Hatyai University, Thailand

²Thammasat University, Thailand

This systematic review paper integrates and analyzes previous empirical results between 2002-2012 to characterize the theories and variables that examine the leadership-innovation relationship. Even though there were many studies examining the effects of leadership on various types of innovation, the empirical results showing the leadership-product innovation relationship were scarce. Among a variety of styles or characteristics of leadership, transformational leadership was used most as explanatory variable to predict innovation. However, there was no single study revealing the positive effect of transformational leadership on product innovation. This article provides the pathway for researchers to further investigate the leadership-product innovation relationship.

A Knowledge Service Framework for Product-design Activities

Si Chen¹, Yan Yan¹, Wang Zhao², Wang Guoxin¹, Zhao Yijing¹

¹Beijing Institute of Technology, China

²Center for Space Science and Applied Research, China

In order to improve the utilization ratio of knowledge and make the knowledge rise in value, a framework of knowledge service for design activities is proposed. Firstly, a product design knowledge representation model is proposed according to the characteristics of design knowledge, and then a knowledge service model based on semantic space is given. Then a method of knowledge service matching is proposed based on the knowledge requirements analysis. Finally, these approaches are used in a knowledge service system for military-vehicle design validating its effectiveness and feasibility.

Capability Development - No Path, Response to Competition: The Cross-case of Google, Ericsson, Microsoft and Nokia

Mait Rungi¹, Alar Kolk²

¹Tallinn University of Technology, Estonia

²Aalto University, Finland

This study is about the capability portfolio development and how the market influences capability development in technology companies. New capabilities can be developed either a proactive way or adapting with the market changes. Alliances, which help in new product development, can co-evolve in a similar vein. This study extends prior findings to ICT industry context and identifies which way is longitudinally more appropriate. Findings are observed from the market emergence phase to the growth phase. As a result, capability development is more adaption with the market rather than proactive action.

Analysis Individual Tacit Knowledge Toward Innovation

Augustina Asih Rumanti¹, Iwan Inrawan Wiratmadja², Trifenaus Prabu Hidayat¹

¹Atma Jaya Catholic University of Indonesia, Indonesia

²Bandung Institute of Techonlogy, Indonesia

This research is based on an issue that tacit knowledge is a crucial asset to create an innovation. Innovation is an important factor for a company to survive in economical competition. Therefore, this research has aims to analyze the correlation between individual tacit knowledge and the company's innovation. This research is done by doing a case study at PT.X. PT X is an automotive company manufacturing in Indonesia. Simulation result using PLS show a strong correlation between tacit knowledge and a company's innovation, tacit knowledge towards individual innovation capability, and individual innovation capability towards company's innovation. But tacit knowledge only has an influence to individual innovation capability. This result is caused by the lack of company's concern to individual tacit knowledge which leads to the problem of individual tacit knowledge codification that is used for doing innovation in a company.

The Mediating Role of Absorptive Capacity between Financial Slack and Performance

Antonio Verdu¹, Lirios Alos-Simo¹, Jose Maria Gomez-Gras¹, Maria Jose Alarcon-Garcia¹

¹University of Miguel Hernandez, Spain

We propose a theoretical model in which organizational performance is explained by absorptive capacity and financial slack. Based on an empirical study we show that absorptive capacity (both potential and realized) mediates the relationship between financial slack and performance.

Session Technology and Knowledge Management (3)

Date Tue, 11 Dec Time 15:30 - 17:30 S227 Room

Song-Kyoo Kim, Bibo Yang Chairs

Technology Evaluation Practices in Universities Technology Transfer Offices

Fernando Romero¹, Antanio Rocha¹

¹University of Minho, Portugal

Technology evaluation and licensing by universities has increased in recent years, stimulated by specific policies that have encouraged quantitative as well as qualitative changes in technology transfer from universities. This paper makes a review of the concepts and practices that are behind technology evaluation and licensing by universities. The literature on this subject is fragmented and dispersed, and the main objective and contribution of this paper is to provide an integrated and comprehensive overview of the concepts and practices on the subject. A conceptual order is generated, allowing the reader to identify concepts and practices, and to easily situate them in terms of their position in the chain of events that constitute the process of technology evaluation and licensing by universities.

Knowledge Visualization in Product Development using Trade-Off Curves

Maksim Maksimovic¹, Ahmed Al-Ashaab¹, Robert Sulowski², Essam Shehab1

¹Cranfield University, United Kingdom

²Sitech, Poland

Resources management has remarkable impacts on production operations in terms of both productivity and efficiency. Faced the challenges in the competitive market, garment manufacturers are always striking for shorter production cycles. Effective resources management is thus essential for the survivals of garment manufacturers. Currently, there is a lack of standardized approaches for effective production resources management in the garment manufacturing industry. This may lead to inefficiency in production performance. Problems aroused include inaccurate resources planning and allocation. This paper presents an intelligent resources management system, integrating both radio frequency identification (RFID) technology and fuzzy logic, specifically for the garment industry. A case study conducted in a Hong Kong garment manufacturing company, which is considered a good representation in the sector, is addressed. Results indicate that the proposed approach outperforms the conventional approaches with better decision making in resources planning.

Impact of Enterprise Strategic Flexibility on Innovation Performance: Based on Dual Perspective of Proactive and Reactive

Zhigang Fan¹, Dongmei Fan², Sun Yuan³

¹Hangzhou Normal Ŭniversity, China

²Zhongnan University of Economics and Law, China

³Zhejiang Gongshang University, China

This study incorporates proactive flexibility and reactive flexibility into the framework of strategic flexibility, and subdivides environmental uncertainty into environmental change rate and environmental change unpredictability. Based on the incorporation and subdivision, it explores the effect of proactive and reactive strategic flexibility on the performance of enterprises and the moderating effect of environmental uncertainty through an analysis of 180 manufacturers. The results show that both proactive and reactive strategic flexibility have positive effects on enterprise performance, the moderating effect of environmental change rate on the relationship between reactive strategic flexibility and enterprise performance turns out insignificant, and that of environmental change unpredictability on the relationship does not exist. The conclusion not only supplements strategic flexibility theory but provides reference for enterprise strategy practice as well.

Care Apparel Design Reuse System: Design and Implementation

Bibo Yang¹, Lei Ai²

¹The Hong Kong Polytechnic University, China

²Donghua University, China

Care apparel is a highly customized product, thus special, creative technical solutions are required in care apparel design. The design process for care apparel is long due to the difficulty in finding proper technical solutions. To improve the design process, a design reuse system is constructed and implemented in a care apparel center. Thus existing products, design features and technical solutions can be reused. In addition, existing products are organized in product families according to

different patients' syndromes. The system improves the design process and reduces the design time and cost.

Patent-based Indicators for Analyzing the Wind Power Markets

Matti Karvonen¹, Rahul Kapoor¹, Tuomo Kassi¹ ¹Lappeenranta University of Technology, Finland

Global climate change and finiteness of current primary energy resources have increased the importance of more sustainable energy sources. For the next decade the wind technology is one the most promising technology in a long transition to more sustainable energy sources. Intellectual property- especially patents related to technological innovation - is at the heart of today's wind energy. This paper aims to analyze the development of wind energy technologies. The patent-based indicators are measured using backward citation analysis, technology cycle time, patent family size and International Patent Classification. The most important wind energy technologies are determined using literature review. Research material is based on the patents of the six leading wind industry actors. The indicators are determined using the patenting activity of the leading firms using the EPO Worldwide database (PATSTAT). The evaluation of the given indicators will give an invaluable insight into the competitive environment in the wind energy industry.

The Role of Funding Source for Commercializing University Patents: Network Analysis on Technology -Industry Linkage Patterns

Yongrae Cho¹, Sanghoon Lee¹, Wonjoon Kim¹ ¹KAIST (Korea Advanced Institute of Science and Technology), South Korea Although the formulation of technology policies focusing on university is a topic that has been well-discussed in academia, more analytic researches have not yet been developed. Especially, the characteristics and source of R&D funding take critical roles for academic researches to be commercialized. This study aims to investigate the differences depending on R&D funding sources - private or governmental - and to formulate the research policy based on empirical results. From a qualitative perspective, we visualize two-mode networks by linking patent and industry codes. From a quantitative perspective, we conduct ANOVA using centrality indices calculated from the network graphs. Overall, we found idiosyncratic patterns in the technology (patent)-industry networks. However, we only observed marginal differences between the two groups. Furthermore, results of the ANOVA showed a difference in closeness centrality between the two groups. We suggest the policy directions which emphasize interdisciplinary researches and strengthen technology's accessibility to industry.

Knowledge Management and Learning Organization: Linking Knowledge-based System to Service Delivery Processes

Wen-Jung Chang¹, Christina Tay² ¹Delin Institute of Technology, Taiwan ²Chinese Culture University, Taiwan

Accompanied with the popularity of life-long education, the old universities today are forced to turn out to be more market-driven and learning oriented. Knowledge is not only a key to effective competition, but also a resource of competitiveness. A learning organization (LO) is reasonably attributed to an effective knowledge management (KM). Even though LO is supposed to be the best solution for the knowledge-intensive industry (KII), past studies rarely focused on this emerging market. Meanwhile, a knowledge based system (KBS) aims to help various staffs to retrieve useful information they need from knowledge system to cope with decision-making problems within organization. To clearly explore the relationship between KM and LO, this paper, using a case study, presents a framework of KBS implemented in SCE to facilitate a good understanding of CE system.

A STEP-based Product Knowledge Model for One-of-a-kind Production

Bomiao Li1, Shane Xie1, Xun Xu1

¹University of Auckland, New Zealand

One-of-a-Kind Production (OKP) is a new manufacturing paradigm for developing customized products with growing product variety in order to meet demands from individual customers in today's markets. Historical product knowledge is of great importance for OKP product development (OKPPD) in which data exchange and sharing is always required for collaborations of systems and integrations of PD activities. Many STEP based knowledge modeling approaches have been developed. However, they have limitations on solving issues in OKPPD. This paper presents a STEP-based data model, and a fourstep modeling method for supporting customized PD activities. A new EXPRESS data model with four sub models is also introduced, and four databases are established based on the proposed EXPRESS data model.

Reliability and Maintenance Engineering (1) Session

Date Tue, 11 Dec Time 11:00 - 12:30 S228 Room

Roger Jiao, ZhengGuo Xu Chairs

Optimal Maintenance Service Contract for Equipments with Availability Target

Bermawi Iskandar¹, Hennie Husniah¹ ¹Bandung Institute of Technology, Indonesia

This paper deals with a maintenance service contract for equipment (such as dump trucks, excavators, etc.) considering availability target. We study the maintenance service contract options from both the owner and OEM point of views and use a non-cooperative game formulation to determine the optimal strategy (pricing structure) for the OEM, and the optimal option for the owner.

Specification of Change Points of Failure Rate or Intensity Function: A Non-parametric Approach

¹Changsha University of Science and Technology, China

The plot of failure rate function or intensity function of an item can have one or two change points where the function value changes quickly. There are many situations (e.g., burn-in testing design and preventive maintenance decision) where the locations of change points need to be specified. This paper presents a non-parametric approach to estimate the change points. The proposed approach is simple and relatively robust. The approach consists of two steps. The first step deals with empirically estimating the failure rate or intensity function and the second step uses a cluster analysis method to specify the change points. Three examples are used to illustrate the proposed approach and its appropriateness.

Reliability Analysis Based on Jump Diffusion Models for an Open Source Cloud Computing

Yoshinobu Tamura¹, Hirona Miyahara², Shigeru Yamada²¹Yamaguchi University, Japan

²Tottori University, Japan

A cloud computing is also attracting attention as a network service to share the computing resources such as networks, servers, storage, applications, and services. We focus on a cloud computing environment by using open source software such as OpenStack and Eucalyptus because of the unification management of data, and low cost. In this paper, we propose a new approach to software reliability assessment based on a jump diffusion model based on the stochastic differential equations in order to consider the interesting aspect of the numbers of components and users. Also, actual software fault-count data are analyzed in order to show numerical examples of software reliability assessment. Moreover, this paper shows that the proposed method of reliability analysis can assist quality improvement for the cloud computing.

Quantification of Organizational Influences on Failure Rate: A Bayesian Approach

Hui Jin¹, Marvin Rausand¹, Ali Mosleh², Stein Haugen¹¹Norwegian University of Science and Technology, Norway²University of Maryland, United States

This paper studies the organizational influences on failure rates. The failure rate model in MIL-HDBK-217F is extended to include organizational factors, and a Bayesian approach is proposed to quantify the organizational influences. In contrast to most explicit organizational models, this paper focuses on extracting information from failure rate data. The proposed Bayesian approach, however, can be combined with the explicit models by using their results as prior information, hence obtain more rigorous result. A numerical example is included to illustrate the model and approach.

Failure Rate Prediction in Various Life Cycle Phases: A Framework for Updating Maryam Rahimi¹, Marvin Rausand¹

¹Norwegian University of Science and Technology, Norway

Failure rate prediction provides a quantitative basis for decision-making regarding the adequacy of a design from the early phases in the life cycle. In real-life operation and maintenance, the operating and environmental conditions may change compared to what was assumed by the producer in the design and development phases. Changes in these conditions and unexpected disruptions may make the current predicted failure rate inaccurate and updating is required as a response to such disruptions and changes. This paper discusses the need for failure rate prediction in the various phases of a product's life cycle and proposes a framework for updating the failure rate prediction to obtain a more realistic prediction. The failure rate updating is based on the data acquired during the period since the previous updating and changes of the status of a set of reliability influencing factors.

Optimal Transmission Lines Assignment in a Multi-source Multi-sink Computer Network

Yun Zhang¹, ZhengGuo Xu¹, JianGang Lu¹, YouXian Sun¹ ¹Zhejiang University, China

For a multi-source multi-sink computer network with fixed network topology, how to assign the transmission lines to the arcs to provide a certain level of network reliability is an important problem worthy of studying. Considering the assignment cost, this paper investigates the optimal transmission lines assignment problem with minimal assignment cost. At the same time, the data transferring reliability between any pair of source node and sink node should not be smaller than a certain reliability threshold. In order to solve the proposed problem, we first propose an assignment cost calculation algorithm under the reliabilities constraints for a transmission lines configuration. Then we adopt the genetic algorithm to search for the optimal solution. Experiments are conducted to illustrate the proposed algorithm. The experiment results show that the proposed algorithm can provide efficient solution in a reasonable time.

Simulation Evaluation of State-based Preventive Maintenance for a Machine with Multiple Quality States

Chao Qi1, Hongwei Wang1, Sivakumar Appa Iyer ¹Huazhong University of Science and Technology, China

²Nanyang Technological University, Singapore This paper considers a single machine system with multiple quality states, representing the deterioration of machine state due to wear and tear or other reasons, using simulation approach. For such a system, a preventive maintenance (PM) scheduling methodology is proposed based on machine quality state. A simulation study is conducted to evaluate the performance of the proposed machine state based PM methodology in comparison with the conventional calendar based PM. Based on the simulation results, it appears that machine state based PM outperforms calendar based PM by achieving higher productivity with lower mean and variance of cycle time. Furthermore, the impact of buffer size and parameter setting of PM methodologies are also investigated.

Session Reliability and Maintenance Engineering (2)

Date Tue, 11 Dec Time 13:30 - 15:00 Room S228

Chairs R. Jiang, Yoshinobu Tamura

Remaining Lifetime Assessment of a Deteriorating System Operating Under Permanent Effect of Fluctuant Environment

Elias Khoury¹, Estelle Deloux¹, Antoine Grall¹, Christophe Berenguer²

¹Troyes University of Technology (UTT), France

²Grenoble Institute of Technology, France

This paper presents a degradation model considering a permanent impact of the environment on the system. A two-stage environment is considered; shocks impacting the degradation rates can occur in the stressed mode. We develop methods to estimate/detect the occurrence of shocks and assess the remaining useful lifetime. The studied examples showed a good performance of the estimation/detection methods.

Thermooxidation Degradation and Life Prediction of Nitrile Butadiene Rubber Based on Kinetics Model

Kun Zhang¹, Jinyong Yao¹, Tongmin Jiang¹

¹Beijing University of Aeronautics and Astronautics, China

To study the aging principle of sealing performance of nitrile butadiene rubber (NBR), a mathematical model is proposed based on the correlation between mechanical performance and microscopic flaws. We assume that oxidative cross-linking and molecular chain scission are two main microscopic flaws of NBR, which could result in performance degradation. In this paper, we use Kinetics model to relate the degradation process with both microscopic flaw mechanisms. Finally thermal-oxidative aging model of NBR is developed for lifetime evaluation. We evaluate our model using compression permanent distortion data which are obtained by accelerated thermal-oxidative aging tests at 60°C, 70°C, 80°C, 90°C and $100\,^\circ\!\!\mathrm{C}$. Comparing with current existing aging model, the experimental results show that our model could simulate the degradation trend of sealing performance accurately. Predictive residual of our model is smaller than 1% at various temperatures and even smaller than P-t model at 70°C and 80°C.

Probabilistic Modeling of Solder Joint Thermal Fatigue with Bayesian Method

Limei Xie¹, Ying Chen¹, Rui Kang¹

¹Beihang University, China

Solder joint thermal fatigue failure is a major cause for the failure of the electronic packaging. It is influenced by the device geometry, material fatigue properties, temperature stress and other parameters. All of these parameters contain uncertainties, whereas Coffin-Manson model which is widely used to evaluate fatigue life does not take uncertainties of model parameters into consideration. In this paper, a probabilistic physics of failure (PPoF) of solder joint thermal fatigue using Bayesian theory to update parameters is put forward. Comprehensively considering the influences of uncertainties of all parameters on solder joint failure, and using Monte Carlo method to solve PPoF model, probability density function for single point failure can be obtained. Through establishing the relationship between the probability of failure and time, stress, structure and materials, this method provides a new way for reliability prediction.

Reliability-Based Structural Design: A Case Study of Car

Yitao Liu¹, Feng Zhou¹, Roger Jiao¹

¹Georgia Institute of Technology, United States

Traditional safety-factor-based design is an approximation of the reality which suffers from both design failure in some case and costly design in most cases. In order to deal with this problem, this paper shows the reliability-based structural design. It takes the external loads, material property, and so on as random design variable to account for the uncertainty embedded in the design process. A case study of car wheel design is used to illustrate the proposed method. Monte Carlo simulation is used to model the uncertainty based on which optimal design is obtained. Furthermore, finite element analysis based on ANSYS Workbench is utilized to validate the

Reliability Assessment and Analysis of Incorporating Fault Tolerance into Service-oriented Architectural Systems

Kuan-Li Peng1, Chin-Yu Huang1

¹National Tsinghua University, Taiwan

To deal with the need of evaluating and ensuring the overall reliability for modern SoA systems, a white-box Markov-based reliability model for SoA systems is proposed in this paper. We consider the service reliabilities and link reliabilities separately, deal with both choreography and orchestration service compositional styles, and also analyze the internal mechanisms of fault-tolerant strategies. Some mathematical probability derivations are given and discussed. Two case studies from real industry practices and problems are presented. We have also developed a versatile assessment tool to provide a quantitative estimation based on our proposed method and model. Experimental results show that the proposed model is useful in analyzing the quality of SoA systems and also in making decision of adopting fault tolerant strategies.

Blade-based Maintenance Policy of Offshore Wind Turbine with the Presence of Covariate under Random Shock

Wenjin Zhu¹, Mitra Fouladirad¹, Christophe Berenguer²

¹University of Technology of Troyes, France ²Grenoble Institute of Technology, France

The blade is the most expensive part of a wind turbine whose failure could be hazardous. The damage of blade is motivated by a mechanism of fatigue and affected by random factors. The technique and price of remote surveillance equipment of rotor blade are becoming well proven and affordable, which makes the monitoring of blade possible. In this paper we model the crack of blade via Paris-Erdogan law considering the intrinsic randomness of the fatigue crack propagation, random shock, random load and dynamic environment. We propose two reactive maintenance policies taking advantage of the monitoring signal as well as obeying the periodic maintenance. Between two periodic maintenances if the control signal exceeds a threshold or a shock occurs, a reactive maintenance will occur. Each maintenance action has to choose one of the two actions: imperfect repair and replacement. The numerical simulations prove that the proposed policy can reduce cost.

Session Project Management (1)

Date Tue, 11 Dec Time 15:30 - 17:30 Room S228

Chairs Leon Pretorius, Tomasz Blaszczyk

An Integer-Programming Approach to Benefit-Maximal Selection and Scheduling of Resource-Constrained

Gianluca Brandinu¹, Norbert Trautmann¹

¹University of Bern, Switzerland

We consider the following planning situation. Given are a set of available projects and a common due date. If a project is completed by the due date, then it creates some benefit. Each project consists of several sub-projects which are interrelated by precedence constraints and require scarce resources during execution. The planning problem consists in selecting some of the available projects, and to schedule the selected projects such that the resource and the precedence constraints are fulfilled and the total benefit is maximized. We formulate this planning problem as a mixed-binary linear program. For the computation of the planning horizon and of an initial solution, we propose a novel priority rule for the well-known serial schedule generation scheme. We report on computational results for 1440 instances, which we have generated based on the PSPLIB instances.

An Investigation into the Relationship between Project Management Maturity and Project Performance in the Telecommunications Industry in Zimbabwe

Tapiwa Murambiwa¹, Marie-Louise Barry²¹University of Pretoria, South Africa

²Tshwane University of Technology, South Africa

Current research on the influence of project management maturity on project performance is conflicting in terms of whether higher project maturity leads to higher project success. This study investigated the link between project maturity and project performance in the telecommunications industry in Zimbabwe. 200 questionnaires were sent out of which 69 valid responses were received. The valid responses were divided into groups of low, medium and high project performance. The results show a positive correlation between project maturity and project performance for projects in the telecommunications industry in Zimbabwe, as organizations where participants perceived low project performance also had a perception of low project maturity, and where participants perceived high project performance there was also high perceived project maturity. The study was exploratory in nature and the results can be tested in various other environments especially in Africa.

Unlocking Critical Success Factors and Criteria in Capital Projects - A Perspective From the South African **Petrochemical Industry**

Marie-Louise Barry¹, Danver Jacobs²

¹Tshwane University of Technology, South Africa

²University of Pretoria, South Africa

This research was aimed at identifying the critical success factors and criteria, as well as their importance, for each project lifecycle phase in the petrochemical industry. An extensive literature review was conducted followed by a focus group exercise to review the critical success factors and criteria. These factors and criteria were then sent via a survey questionnaire to a population of 1,035 people and the number of valid responses received back was between 103 and 139, depending on the life cycle phase. The research results indicated that there is not a unique set of factors and criteria in each phase of the project lifecycle. Some factors are considered very important in more than one project phase. The research results show that some of the factors and criteria significantly change in importance when a project moves to the next phase of execution.

Responding to an Ageing Workforce and the Implications for Engineering Management

Julien Pollack1

¹University of Technology Sydney, Australia

Most organisations are, or in the near future will be, faced with the need to respond to issues associated with their ageing workforce. This paper explores the implications of workforce ageing on engineering management, and reviews one organisation's implementation of a programme designed to mitigate the effects of workforce ageing on the potential for loss of knowledge and

effectiveness as experienced personnel retire. This successful programme is analysed through a framework provided by systems thinking, to understand the effects of the non-traditional approach to programme management used in this case.

Risk Crash: a New Approach to Quantify the Relationship Between Risk of Delay and Project Duration

Tommaso Salvagnini¹, Giorgio Locatelli², Mauro Mancini¹, Edoardo Cesa Bianchi1

¹Politecnico di Milano, Italy

²University of Lincoln, United Kingdom

Currently companies ask their project managers to deliver projects on budget within a schedule shorter than their competitors. The project management literature proposes many algorithms to deal with the classical trade-off of cost vs. time, the so called crushing. The goal of these algorithms is to decide which activities should be shortened (at a higher cost than standard) in order minimize the overall cost given a fixed project duration. The major pitfall of these approaches is that they do not consider the level of risk for the different duration. On the one hand, shortening the duration (i.e. crushing the project) requires more advanced and novel solutions, increasing the technological risk of the project. However the shorter exposure time of the new solution will decrease the project risk from external adverse events. This paper presents a new approach, grounded on the literature about buffer management, to manage this risk-time trade-off.

Role Development for Interdisciplinary Collaboration Support in Biomimetics

Manuela Iulia Parvan¹, Hendrik Oepke¹, Katharina Kaiser¹, Udo Lindemann¹

¹Technische Universitat Munchen, Germany

In biomimetics technical problems are solved by transferring solutions and knowledge from biology into engineering design. This process often involves the generation of innovative concepts. The interdisciplinary collaboration and communication between biologists and engineers represents a main challenge in the process. Difficulties occur due to differences in terminology and methodology as well as operation processes used. This paper presents the development of roles in biomimetics, generated by combining biology and engineering tasks and characteristics. The new roles and tasks assessed can be used to facilitate the collaboration and communication between biologists and engineers. The roles developed are based on the insights and results gathered from an observation study done by engineers within a representative working group from biology. The study includes the analysis of tasks, work steps, data processing as well as communication methods and tools and information flows.

A New Event-based MILP Model for the Resource-constrained Project Scheduling Problem with Variable Intensity Activities (RCPSVP)

Alain Hait¹, Georges Baydoun¹

¹University of Toulouse, ISAE, France

This paper presents a new MILP formulation for the resource-constrained project scheduling problem with variable intensity activities (RCPSVP). It is based on the continuous time representation of activity start and end events, together with the discrete time representation of resource constraints. Computational results show the strong performance of this approach, compared to former solution approaches.

Resource Constrained Project Scheduling Problem: A DEA based Genetic Algorithm

Behzad Ashtiani¹, Fatemeh Paidar¹, Amir Masoud Hosseinmardi¹, Esmaeil Najafi Trojani¹

¹Science and Research Branch of Islamic Azad University, Iran

Resource constrained project scheduling problem (RCPSP), belongs to the class of NP-hard problems. Many researchers have solved this problem via variety of heuristics and meta-heuristic approaches. Genetic algorithm- one of the meta-heuristics approaches- has been used frequently to solve this problem. Since different methods have been presented for improving the GA to achieve better results, in this paper we propose genetic algorithm-employed data envelopment analysis (DEA) to handle project scheduling problem with resource constraints. Computational results illustrated that DEA based GA outperforms pure GA.

Session Intelligent Systems (1)

Date Tue, 11 Dec Time 11:00 - 12:30 S229 Room

Chairs Jose Machado, Jaekyung Yang

Intelligent Systems based in Hospital Database **Malfunction Scenarios**

Paulo Silva¹, Cesar Quintas², Pedro Goncalves¹, Gabriel Pontes¹, Manuel Santos¹, Antonio Abelha¹, Jose Machado¹

¹University of Minho, Portugal

²Centro Hospitalar do Porto, Portugal

Databases are indispensable for everyday tasks in organizations, particularly in healthcare units. Databases archive important and confidential information about patient's clinical status. Therefore, they must always be available, reliable and at high performance level. In healthcare units, fault tolerant systems ensure the availability, reliability and disaster recovery of data. However, these mechanisms do not allow taking preventive actions in order to avoid fault occurrence. In this context, it emerges the necessity of developing a fault prevention system. It can predict database malfunction in advance and provides early decision taken to solve problems. The objectives of this paper are: monitoring database performance and adapt a forecasting model used in medicine (MEWS) to the database context. Based on mathematical tools it was created a scale that assesses the severity of abnormal situations. In this way, it is possible to define the scenarios where database symptoms must trigger alerts and assistance request.

Monitoring Intelligent System for the Intensive Care Unit using RFID and Multi-Agent Systems

Rui Rodrigues¹, Pedro Goncalves¹, Luis Miguel Miranda¹, Carlos Filipe Portela¹, Manuel Santos¹, Jose Neves¹, Antonio Abelha¹, Jose Machado¹ ¹University of Minho, Portugal

In an environment where patients' lives are at stake, Intensive Care Units (ICUs) become a good scenario for the implementation of Ambient Intelligence, helping medical professionals in their task of retrieving the well-being to patients. INTCare project is a system that aims the real-time monitoring of patients, and predicts their outcome in a short period of time. When patients' vital signs get out of range, an alert system warns medical staff about the patient condition. PaLMS, a Patient Localization and Monitoring System, is being developed and tested in Centro Hospitalar do Porto - CHP, a hospital in Portugal. It uses RFID technology with a multi-agent architecture for communications inside hospital, thus providing a way to improve INTCare by ending the storage and analysis of redundant data, collected when the patient isn't in the bed, plus stopping the warning events triggered by the vital signs out of range.

Image Analysis for Pig Recognition Based on Size and Weight

Apirachai Wongsriworaphon¹, Supachai Pathumnakul ¹, Banchar Arnonkijpanich¹

¹Khon Kaen University, Thailand

Stockman or farmers always have difficulty recognition of pig mass in their farms. The typical approach is to approximate from age of pigs, daily- given feed, or from experience of human vision. Another practical approach to instantly measure mass of pigs is to use machine vision. The objective of this paper is to use a developed machine vision to analyze pig mass for detection of size and weight of pigs in farm. The pig mass is processed from physical features captured from digital image and their liveweights are approximated from artificial neural network. This neural network model is based on vector-quantized temporal associative memory (VQTAM) and locally linear embedding (LLE). The elementary results showed that the mass approximation of pig weight had acceptable accuracy and it was practical in pig farms.

Ontology-Based Context Model of Turret

Qiqi Yin¹, Qing Xue¹, Minxia Liu¹, Kan Zhang¹ ¹Beijing Institute of Technology, China

One of the most important points in contextaware is to build a reasonable context model. At present, many models were not built in a common structure. It is hard to build other models on the basis of the existing ones. In this paper, we build an ontology-based context model with Web Ontology Language (OWL), which provides an efficient and convenient way of ontology-building by adding domain specific concepts into this ontology model. We show the structure of the model and explain the main concepts of it. Turret context described by OWL language is the foundation to realize the intelligent weapon interface

An Artificial Neural Network Approach for Estimating Suitable Ratio of Filling Fat in Animal Feed Production

Mongkon Ittiphalin¹, Supachai Pathumnakul ¹, Kullapapruk

Piewthongngam¹, S. Homdee¹

¹Khon Kaen University, Thailand

In this paper, the optimal ratio of fat filling into mixer in animal feed production in Thailand is addressed. In feed production, additional fat filling directly into mixer affects to the rate of production and physical property of feed pellet. The suitable of fat filling into mixer will provide high pelleting production rate, while the durability of the pellet is still in the standard requirement. In this paper, an estimating model based on the artificial neural network (ANN) approach has been developed for solving this problem. Four factors, which are die size, fiber inclusion, total fat and durability, are considered as inputs of the model, in order to recommend suitable ratio of additional fat filling into mixer. Comparison of predicted and actual data has guaranteed the efficiency of the proposed approach. The highest mean absolute percent error (MAPE) of the model is 10.62%.

Rule Extraction Using Firefly Optimization: Application to

Banking Naveen Nekuri¹, Ravi Vadlamani¹, Raghavendra Rao C², Sarath K.N.V.D¹ ¹Institute of Development and Research in Banking Technology, India ²University of Hyderabad, India

In this paper, we proposed a rule mining algorithm based on firefly optimization and named it as firefly miner. The main objective of firefly miner is to extract classification rules from a given dataset. The effectiveness of the proposed algorithm is tested on eight data sets namely viz., four bankruptcy prediction and one credit scoring datasets and three benchmark problems taken from literature. We performed 10 fold cross validation testing and observed that the results obtained by firefly miner in terms of sensitivity, accuracy, area under ROC curve (AUC) and the number of rules are encouraging when compared to that of a baseline decision tree (DT).

Session Intelligent Systems (2)

Date Tue, 11 Dec Time 13:30 - 15:00 S229

Room

Chairs Allan Nengsheng Zhang, Ronnachai

Sirovetnukul

An AI-based System for Telecommunication Network

Kin Poon¹, Andrej Chu¹, Anis Ouali¹

¹Khalifa University of Science, Technology and Research, United Arab Emirates Today's telecoms market is filled with severe competition and tight budget. Many network operators are striving for different ways to reduce their operating cost while still providing excellent services to their customers. One of the possible savings that can be made is to apply software planning tools to automate network designs at the lowest possible cost. In this paper, we describe an AI based system which can automate/optimize the planning process. It facilitates the implementation of different optimization algorithms to solve network design problems. A case study of physical layer design for FTTH networks is provided. In this paper, an overview of the system is provided. The problem definition of the FTTH network design and three optimization approaches (i.e. Mixed Integer Linear Programming (MILP), Ant Colony Optimization (ACO) and Genetic Algorithm (GA)) are described. Finally, different sizes of networks are used to illustrate the performance of each approach.

An Efficient Approach for Updating the Structure for **Mining Frequent Patterns**

Show-Jane Yen¹, Yue-Shi Lee¹, Jia-Yuan Gu¹

¹Ming Chuan University, Taiwan

Mining frequent patterns is to discover the groups of items appearing always together excess of a user specified threshold from a large transaction database. However, the transactions will grow rapidly, such that the frequent itemsets may be changed due to the addition of the new transactions. The users may eager for getting the latest frequent itemsets from the updated database as soon as possible in order to make the best decision. Therefore, it has become an important issue to propose an efficient method for finding the latest frequent itemsets when the transactions keep being added into the database. For the previous tree based approaches, they have to re-scan the original database and generate a large tree structure. In this paper, we propose an efficient algorithm which only keeps frequent items in a condensed tree structure. When a set of new transactions is added into the database, our algorithm can efficiently update the tree structure without scanning the original database.

Architecture of Knowledgeable Manufacturing System and Knowledge Representation Methods

Youlong Lv1, Wei Qin1, Jie Zhang1 ¹Shanghai Jiao Tong University, China

Improvement of manufacturing systems is an important problem in factories as it is the basis of high productivity scheduling and can help factories well-adapted to changing environments. However, improving decisions are made mainly upon human experiences and reliable decisions through theoretical analysis are still vacant. This paper analyzes the requirements to build a knowledge manufacturing system (KMS) which can provide improving advices for manufacturing systems through theoretical analysis. Efforts to realize those requirements are discussed in entity-relationship (ER) diagrams. The framework of KMS is proposed as requirements and their relationships turn into shape. Afterwards, knowledge representation model of different knowledge classifications is built for efficient extraction and employment of information manufacturing systems, lays the foundation of KMS framework.

An Intelligent System for Production Resources Planning in Hong Kong Garment Industry

Kar Hang Carmen Lee¹, K.L. Choy¹, Kris, M Y Law¹, G.T.S. Ho¹

¹The Hong Kong Polytechnic University, Hong Kong

Resources management has remarkable impacts on production operations in terms of both productivity and efficiency. Faced the challenges in the competitive market, garment manufacturers are always striking for shorter production cycles. Effective resources management is thus essential for the survivals of garment manufacturers. Currently, there is a lack of standardized approaches for effective production resources management in the garment manufacturing industry. This may lead to inefficiency in production performance. Problems aroused include inaccurate resources planning and allocation. This paper presents an intelligent resources management system, integrating both radio frequency identification (RFID) technology and fuzzy logic, specifically for the garment industry. A case study conducted in a Hong Kong garment manufacturing company, which is considered a good representation in the sector, is addressed. Results indicate that the proposed approach outperforms the conventional approaches with better decision making in resources planning.

Buyer-Supplier Predicting Offers in Supply Contract Negotiation Using Neural Network

Yusraini Muharni¹, Chao Ou-yang², Chun Ching Lee³

¹National Taiwan University of Science and Technology, Taiwan, University of Sultan Ageng Tirtayasa, Indonesia

²National Taiwan University of Science and Technology, Taiwan

³Tungnan University, Taiwan

The application of neural network in various field had significant interest these days. In supply contract negotiation, buyer or supplier faced uncertainty situation. Different bargaining power contributes in the difficulties in making decision. By means of neural network, agent equipped with capability to learn from past negotiation. In this study, we attempt to develop an artificial neural network predictive model. The simulation was used to exhibit negotiation process between buyer and supplier. The Levenberg-Marquardt algorithm has been used to train the neural network and shown the good performance. Applied artificial neural network predictive model in negotiation process enables each party forecasts subsequently for opponent next offer. The advantage of this work is in ability to short the negotiation round which is increase the negotiation efficiency.

Session Safety, Security and Risk Management (1)

Date Tue, 11 Dec Time 15:30 - 17:30

S229 Room

Chairs R.M. Chandima Ratnayake, Masanori Akiyama

Addressing IT Security in Practice: Key Responsibilities, Competencies and Implications on Related Bodies of Knowledge

Younes Benslimane¹, Ankit Patel¹, Bouchaib Bahli², Zijiang Yang¹ ¹York University, Canada

²ESC School of Business, France

This paper examines the responsibilities and the required skills for Information Technology (IT) security professionals. analysis of relevant jobs postings helped identify four types of positions and the associated responsibilities and requisite skills. The identified skills were further analyzed to assess their consistency with the identified responsibilities. Finally, the Body of Knowledge (BOK) for three relevant disciplines (Information Systems, IT and Computer Science) are reviewed to assess the extent to which they cover knowledge needed to address IT security in organizations. Findings identify possible gaps in the BOK and areas for improvement.

Hybridization of Statistical and Cognitive Experience Feedback to Perform Risk Assessment. Application to Aircraft Deconstruction

Eric Villeneuve¹, Cedrick Beler¹, François Peres¹, Laurent Geneste¹ ¹LGP/ENIT - Université de Toulouse, France

This paper aims to present a study on knowledge management. We develop decision-support mechanisms hybridizing statistical and cognitive experience feedback to perform risk assessments on critical areas of a system. We propose an approach for combining expert opinion and statistics by using belief functions and by processing the combined knowledge in a directed evidential network to provide a risk measure.

A Study of Fire Evacuation from an Industrial Building Using Šimulex

Diana Freitas¹, Pedro Arezes¹ ¹University of Minho, Portugal

The purpose of this study was to evaluate the evacuation conditions of a industrial building, through the analysis of the influence of an emergency plan on the evacuation performance. With this purpose, two building configurations were considered, the current and a new configuration, which resulted of adding a staircase. Four tests were made, two for each building configuration. In the simulations, several variables were considered, such as the distance to the meeting point, the distribution of people through the multiple emergency exits, evacuation paths width, both horizontal and vertical, as well as the pre-evacuation time. From the obtained results, it was possible to conclude that the evacuation time does not depend only on the distance but also on a set of factors related to the building, such as the evacuation path width and the existence of stairs, as well as the amount of people placed around the emergency paths.

Noise Risk Assessment of Taiwan High Speed Rail

Kang-Ting Tsai¹, Y. T. Huang¹, Min-Der Lin¹ ¹National Chung Hsing University, Taiwan

Excessive noise is a major environmental complaint and potential health risk in residential areas. Since the Taiwan High-Speed Rail (THSR) operated, its noise impact has become a newly emerging issue of concern. Although THSR has installed metal sound barriers along the noise-sensitive areas, many residents still keep complaining about the noise, indicating that the noise problem along THSR is an emergent issue to be investigated. This study assesses the noise impacts along THSR, and evaluates the robustness of the noise reduction strategies and control regulations. The results show that when the trains pass by, the LAmax has greater impacts on upstairs residents than downstairs due to the THSR used elevated railway, and the noise may increase over 20dB(A) than the background noise level. A preliminary estimation indicated that there are about 2,500 residents in the investigated area exposed to unacceptable noise environments, and further noise reduction/abatement strategies are necessary.

The Effect of Maintenance Seen From Different Perspectives on Major Accident Risk

Peter Okoh¹, Stein Haugen¹

¹Norwegian University of Science and Technology, Norway

Societies worldwide have been surprised and saddened by the occurrence of certain major unwanted events after having made considerable efforts to control the dynamics of whatever organization or systems they manage. Texas City Refinery Explosion (2005) and the Piper Alpha Disaster (1988) are two examples of maintenance-related major accidents with highly devastating consequences. Major accidents may be viewed from the following perspectives: Energy-Barrier, Normal Accident, High Reliability Organization (HRO), Man-made Disaster, Conflicting Objectives, and Resilience Engineering. In reality, few of these perspectives are actually used in practical risk management – it is the energy-barrier principle which is dominating completely. The objectives of this paper are: (1) To find out how maintenance fits into the aforementioned perspectives on major accidents, and (2) To discuss how the perspectives can influence maintenance.

Study on Classification of Safety-related Organizational Factors in a Nuclear Power Plant

Dai Licao¹, Pengcheng Li¹, Huang Shudong¹, Zhao Ming¹ ¹University of South China, China

On the basis of the existed classification system of organizational factors, questionnaire and event analysis, a more comprehensive classification scheme is developed. The main framework is composed of target and strategy, organizational structure and organizational culture. The scheme makes efforts to overcome the deficiencies of the other classification system. On the basis of this classification framework, 71 human factor events between 2000 and 2003 are reanalyzed. Through descriptive statistical analysis, main management deficiencies in connection with organization are identified. On the basis of R-type clustering, main categories of organizational factors are concluded

Quantitative Research of Risk Relationships of Sewage Treatment Plants Based on Concession Operation

Hui Sun¹, Yanhong Lu¹ ¹Tianjin University, China

The risk problem of concession operation is the crucial problem, the research of the problem is helpful to avoid risks for the governments, financing parts and contractors and crucial for the success of the projects. The aim of the paper is to study the risk relationship of the sewage treatment plants based on the concession mode. By the way of literature review, data collection and model matching etc. the risk relationship of the sewage treatment plants is quantified, which provide a reference for the risk management of the projects.

Theoretical Research on Crossflow Pollution in Short **Distance and Continuous Road Tunnels**

Pai Xu1, Shu-ping Jiang2, Zhi Lin2, Jian-zhong Chen2

¹Chongqing Jiaotong University, China

²China Merchants Chongqing Communications Research & Design Institute Co., Ltd., China

In the researches on tunnel ventilation in domestic and abroad, the crossflow problems of polluted air between short distance and continuous tunnels are mostly ignored. When the ventilation system is designed, special treatments about crossflow are usually not done. Therefore, the further theoretical research on crossflow problems is particularly urgent and necessary. Based on this, firstly, the short distance and continuous tunnel ventilation system is simulated by numerical simulation software Fluent and the new concept is proposed, i.e. crossflow ratio. Secondly, the simulated results are analyzed, the rules are revealed and the crossflow ratio formula is fitted by software Origin8.0. Finally, check criteria in the continuous tunnel ventilation design and theoretical measures of preventing crossflow pollution are proposed. The crossflow ratio and check criteria provide theory evidence for short distance and continuous tunnel ventilation design in the tunnel group.

Session Poster Session 1 Date Tue, 11 Dec Venue Level 2 Foyer

Integration of Supply Chains via Vertical Merger and Acquisition: Mechanism and Policy

Haiyan Yan¹, Wenbin Zhao¹, Bo Xu¹ ¹Shanghai Institute of Foreign Trade, China

The paper analyzes functional theories about integration of supply chains via vertical merger and acquisition. It simulates the supply chains integration process of vertical M&A and carries out policy analysis from the two aspects of structural adjustment and parameter adjustment.

Enabling of Sustainable Supply Chain Management with Lean Thinking - A Comparative Study of Manufacturers in Kyoto Protocol Signatory Countries

Stuart So1, Hongyi Sun2

¹The University of Queensland, Australia

²City University of Hong Kong, Hong Kong

The research formulates a sustainable supply chain management (SSCM) strategy for manufacturers by showing the potential of lean thinking that lead corporate sustainability to success. A comparative study of 655 manufacturing firms was conducted in 21 Kyoto Protocol signatory countries. A research model and 3 hypotheses are proposed with the sample divided into 2 groups: (a) firms in developed countries; (b) firms in developing countries. There is remarkably good generalization to the first group, where the findings can be a good reference to manufacturers in developing countries. The results show that ongoing commitment to SSCM is significantly influenced by its regularization in operations on the basis of lean thinking as sustainable practices and enterprise resources planning (ERP) systems that enable information sharing in sustainable enterprises. The results imply that larger than average sized manufacturers may consider going lean before moving toward adopting sustainability for a better chance of success.

The Impact of Information Technology on Supply Chain Management Capabilities: A Resource-Based View

¹Minghsing University of Science and Technology, Taiwan

The objective of this paper is build upon prior research [1], to provide some new perspectives in explaining how Information Technology (IT) can create a sustained competitive advantage (SCA) and supply chain quality management (SCQM) capabilities for the firm. The result shows that most of IT resources are positively related with SCQM capabilities and firm performance. Especially, the outside-in and spanning resources are more likely to achieve better supply chain quality capabilities and provide a SCA for firm performance.

A Heuristic Method based on Genetic Algorithm for Storage Location Assignment in a Pick-and-Pass Warehousing System with Multiple Pickers

Po-Hsun Shih¹, Jason Chao-Hsien Pan², Ming-Hung Wu² ¹Vanung University, Taiwan

²Takming University of Science and Technology, Taiwan

Pick-and-pass systems play an important role for the faster delivery of small and frequent orders of inventory with the rise of e-commerce and e-business in the global supply chain. Two factors lead to idle time of pickers in a pick-and-pass system: unbalanced picking line and shortages of products. This study develops an order storage assignment policy (SAP) based on genetic algorithm for a pick-and-pass system with multiple pickers to balance the workload of each picking zone and determine the most appropriate storage space for each product so that the performance of the system can be improved.

Value Stream Mapping Analysis for Improving the Harvesting and Transport Processes of Cotton

Yulin Li1, Shuping Yi2

Chongqing University,Shihezi University, China

²Chongqing University, China

The purpose of this paper is to present a study on how Value Stream Mapping (VSM) can be applied to the processes management of agricultural field operations. The aim is to eliminate non-value-adding (NVA) waste from the value stream of cotton harvesting and transport. The harvesting and transport process in a

cotton plantation is visualized by mapping the current state value stream. After analysis of the current status VSM and elimination of unnecessary NVA waste, a future state VSM was drawn, with which the cycle time of cotton harvesting and transport is expected to be shortened from 30.93 days to 23.55 days, representing a 24% reduction, and manpower in the interface of cotton receiving is decreased from 12 to 8 persons. The research results indicated that value stream mapping is a potential technique to improve the efficiencies of farm work and reduce production costs in arable

Decision to Refurbished Products Based on Cost-benefit of Remanufacturing Model in Closed Loop Supply Chain

Yan Liang¹, Joseph Chen¹

¹Bradley University, United States

This paper builds a remanufacturing supply chain model based on cost-benefit equations. This model helps companies to determine whether or not they should manage refurbished products or let third-party companies handle them. This remanufacturing supply chain model was tested by a case study. The contributions of this paper are: 1. Our refurbished products supply chain model provides suggestions to manufacturers as to whether or not they should manage their own refurbishing or let third-party companies handle it. 2. The result of the testing indicates: new products' prices and return rates are significant to the output (Loss), and the higher the price of a product and its return rate, the more profitable it is to manage that product's refurbishment.

Effects of Information Transparency on Supply Chain **Quality Management**

Jing Hua Xiao¹, Zhao Lin Cheng¹, Cai Wen Zhang¹, Kang Xie¹ ¹Sun Yat-Sen University, China

In supply chain management, it is conventional for the customer to use quality contracts and punishment to control its supplier's opportunistic behavior and ensure quality. However, this mechanism is reactive and its effects are hardly satisfactory. In this study, we are interested in introducing a new mechanism into supply chain quality management-information transparency. A principal-agent model is formulated to investigate the impacts of sampling inspection and information transparency on supply chain quality management. It is shown that the combined use of the two mechanisms can significantly improve the supply chain performance compared to using either of the mechanisms alone.

Towards Better Supply Chain Visibility - the Design and Implementation of a Supply Chain System S-ConTrol to Support an Operational HQ in Singapore

Wen Jing Yan¹, Puay Siew Tan¹, Niak Wu Koh¹, Tan Yong Qiang¹, Allan Nengsheng Zhang¹

¹Singapore Institute of Manufacturing Technology, Singapore

Visibility into supply chain can give company a competitive advantage in today's growing global operations. Medium Enterprises (SMEs) grow beyond Singapore, there is a need to help them to setup operational headquarters (OHQs), with Control Tower capabilities to better manage their supply chains, for better productivity and customers' satisfaction. This paper discusses the challenges in designing, developing and implementing a supply chain system, SMEs Control Towers (S-ConTrol), to support such a Control Tower. A two-phase systematic approach for the system design and implementation was proposed. In the first phase, a top-down business analysis combined with target driven bottom-up data analysis process was executed to address the business needs and identify the challenges. The second phase was the implementation of the solution to fulfill the business needs. The system has been successfully deployed in a local company and its regional customer centres (RCCs) with tangible productivity gains achieved.

Hybrid Ant Colony Optimization for Library Distribution Network

Weidong Lin¹, E.S. Chan¹, S.Y. Chia¹, H. Li¹

¹Temasek Polytechnic, Singapore

This paper describes a new designed materials distribution network of public libraries under National Library Board of Singapore. In the new design, the whole distribution network is segregated into a number of sub-networks, or regions, with Library Supply Center (LSC) as a central depot. The route planning for each region could be modeled as a vehicle routing problem (VRP) with both pickup and delivery, and a hybrid ant colony optimization approach is proposed to solve the problem. The initial results demonstrate significant cost savings and efficiency improvement compared with the existing network.

Using Decision Analysis Method to Evaluate the Cost-effectiveness of Similar effect Medical Materials in Hospital

Nai-Chuan Fang¹, Ming-Jong Yao², Tsueng-Yao Tseng³¹Taichung Veterans General Hospital, Taiwan
²National Chiao Tung University, Taiwan
³Tung Hai University, Taiwan

In order to balance the trade-off between medical quality and cost reduction, hospitals have to keep making critical decisions on choosing a best cost effectiveness of hospital materials. This study aims to develop approaches for the evaluation of hospital materials. Since it is a multi-criteria decision-making problem, we first screen the critical factors and dichotomize them into two categories, the quantitative indicators and the qualitative indicators. The quantitative indicators include "daily expenses", "profits", "consumption of quantity" and "side effects". The qualitative indicators include "production quality", "physician preference", "special formulation or design" and "stability and convenience". We proposed to evaluate the quantitative indicators and the qualitative indicators by data envelopment analysis and analytic hierarchy process, respectively. The proposed approaches are able to acquire a ranking of the cost-effectiveness of hospital materials. Following our case study, we conclude that the proposed approaches may serve as more objective and effective decision-support tools for the decision-makers.

2-tuple Linguistic Prioritized Harmonic Applied to Group Decision Making

Decision Making
Jin Han Park¹, Jong Jin Seo¹, Young Chel Kwun²
¹Pukyong National University, South Korea
²Dong-A University, South Korea

In this paper, we develop some 2-tuple linguistic prioritized aggregation operators such as 2-tuple linguistic prioritized weighted harmonic (2TLPWH) operator and 2-tuple linguistic prioritized ordered weighted harmonic (2TLPOWH) operator, and study some desirable properties of the operators. Then, we apply them to develop approaches to multiple attribute group decision making, with linguistic information, in which the attributes are in different priority levels. Finally, an example is used to illustrate the applicability of the developed approach.

The Associations between Professional Commitment, Learning Burnout, and Grade Point Average in Independent College Students

Aiqun Yu¹, Ji-Wei Ma², Yi-Wen Chen²

¹Key Laboratory of Behavioral Science, Institute of Psychology, Chinese Academy of Sciences; Canvard College, Beijing Technology and Business University, China ²Institute of Psychology, Chinese Academy of Sciences, China

This study was conducted to investigate the features of independent college students in professional commitment and learning burnout. 390 students were chosen from an independent college in Beijing. The levels of professional commitment, learning burnout and GPA were measured by scales for professional commitment and learning burnout. The data were analyzed by correlation and regression analysis. There existed a significant difference in the dimensions of professional commitment and learning burnout and total scores among different grade students in the independent college. The levels of professional commitment and learning burnout were significantly related with grade point average. Our results provided a theoretical basis for the teaching reformation of independent colleges.

AHP in Prioritizing Vibration Parameters for Maintenance of Machine Tools

Manjunath Gowda¹, H. N. Suresh¹, K. M. Basappaji¹ ¹Jawaharlal Nehru National College of Engineering, India

With the development of industry, machineries are becoming increasingly complex with extreme demands of equipment availability, reliability and maintainability. In order to accomplish this goal, efficient and continuous maintenance strategies need to be implemented. Vibration analysis is one of the most popular techniques for the maintenance of machinery. There are several parameters which contribute to the vibration of machines. This paper presents analytic hierarchy process to prioritize from among several parameters under different conditions which contribute to vibration of machines. T. L. Saaty's theory and expert elicitation is applied for ranking the parameters. Pair wise comparison parameters under different working conditions of the machine is done, vibration levels are obtained and are represented graphically and are compared against each other, to rank the parameters which cause more vibration than the other.

Mathematical Programming Model for Type-I Two-sided Assembly Line Balancing Problem

Hsiu-Hsueh Kao¹, Din-Horng Yeh², Sih-Ting Huang²

¹Tamkang University, Taiwan

²National Chung Cheng University, Taiwan

Two-sided assembly line balancing problem (TALBP) is commonly seen in the industries of assembling large-size products; typical examples include automobiles, buses, trucks, etc. Unlike the traditional assembly lines, assembly tasks in TALBP must be processed on both sides of the assembly line. Only limited researches discuss the issues of TALBP. We consider in this study the so-called type-I TALBP (TALBP-I), and the objective of this study is to propose a mathematical programming model to find the optimal task assignment of TALBP-I. An illustrative example is given to show the effectiveness of the model. We also show that, through numerical experiments, the model can be extended to solve type-II TALBP (TALBP-II).

The Design of an AGV in the Manufacturing Cell

Suksan Prombanpong¹, W Kiattiphatthananukul¹, A Songsanan¹, Assariya Sukin¹

¹King Mongkut's University of Technology Thonburi, Thailand

An automated material handling system is a must for an automated production system. An AGV (automated guided vehicle) therefore is one of the promising carriers used in the production line as a link between stations. However, an algorithm for determination number of AGVs required to satisfy the production is not quite prevalent and sometimes it is complicated. This paper aims to demonstrate a calculation of AGV required and then to verify the result by a simulation program. It is found that this proposed methodology is very useful and applicable for an early stage design of AGV. In the study case with 15 stations and elapse time ranging from 7 to 233 minutes. The required number of AGV is 8 units with 87.76% utilization and 3.44 second system waiting time.

The Improvement in the Reliability Problem for Air Current Breaker's Over Current Protect Function

Cheng-Chung Chien¹, C.N. Chang¹, Yung-Tang Wu¹, C. C. Tseng¹, D.H. Chiu ¹, J.K. Wan¹, C.S. Wu¹, C.T. Hsu¹, E.D. Chen¹, F.H. Li¹, T.H. Shao¹

Tainwan Semiconductor Manufacturing Company, Taiwan

Almost all plants have the experience of ACB's overcurrent relay (OCR) unexpectedly trip event. Each accident will cause a huge production loss. But manufacturers of OCR can't afford the cost-effective solution of problem. The most used solution is to install an additional relay (ex.ABB Relay B) to replace the function of the ACB's OCR or to adopt a new ACB to replace the old one. These two uneconomical solutions are not only high cost but also time consumption on annual PM. Thus, authors proposed a novel solution by interlocking the main ACB's relay and the feeder ACB's OCR function to prevent the ACB tripped by OCR false tripping signal. This method does not require additional relay and current transformer. Therefore, it is a cost-effective and time saving solution.

A Study of Software Reliability Growth Model for Time-dependent Learning Effects

Kuei-Chen Chiu1

¹Hsing Kuo University of Management, Taiwan

This paper considered time-dependent learning effects in the software reliability growth model which Chiu et al. (2008) provided from the perspective of learning effects and would be able to reasonably describe the S-shaped and exponential-shaped types of behaviors simultaneously, and had better performance in fitting different data with consideration of a constant learning effect to enhance the model. This study assumed learning effects were depend on the process time and improved the model with linear-learning effect and exponential-learning effect to discuss when and what learning effects would occur in the software development process. This paper also verified the effectiveness of the proposed model with R square (Rsq) and compared with other models by using the comparison criteria with real data set. The results revealed that the proposed model shows good fitting in the data set which software development process exists time-dependent learning effects.

Research on Machining Process Reliability in Multi-procedure Machining Processes

Ping Jiang¹, Yunyan Xing¹, Yajie Liu¹, Bo Guo¹, Gan Lin² ¹National University of Defense Technology, China

The performance evaluation of machining procedures based on historical data is the key criteria in multi-procedure machining process planning. Current evaluation methods for machining procedures focus on the dimensional variations in key product characteristics, which may face the computation complexity when large number of procedures are involved. Therefore, this paper introduces the definitions of machining process reliability and corresponding machining process reliability block diagrams (MPRBDs), to be applied to evaluate the performance of procedures for machining process planning. The definition of machining process reliability is different from that of traditional reliability, and leads us to evaluate machining process' performance of ensuring product quality characteristics in terms of reliability. The machining process reliability models are presented to describe the impacts between the machining procedures and on the machining process reliability as

Vibrations of Timoshenko Beams with Damping and **Forcing Terms**

Norio Yoshida¹

¹University of Toyama, Japan

We investigate the vibrations of Timoshenko beams with external and internal damping terms and forcing terms by mathematical method. In particular, we study the existence of zeros of solutions of Timoshenko beam (of length L) equations in a cylindrical domain f(x; t); 0 < x < L; t > 0g. End conditions to be considered are hinged ends (pinned ends), hinged-sliding ends and sliding ends. Our approach is to reduce multi-dimensional problem to one-dimensional problem (i.e., a problem for ordinary differential inequalities).

A Performance Comparison Between the Base Stock (BS), Traditional Kanban Control System (TKCS) and Extended Kanban Control System (EKCS)

Alvin Ang1

¹Nanyang Technological University, Singapore

This paper presents a simulation experiment done comparing the Single Stage, Single Product Base Stock (BS), Traditional Kanban Control System (TKCS) and Extended Kanban Control System (EKCS). The results showed that BS incurs the highest cost in all scenarios; while EKCS is found to be effective only in a very niche scenario. TKCS is still a very powerful factory management system to date and it was a letdown that EKCS did not perform exceptionally well. The only time EKCS did outperform TKCS was during low demand arrival rates and low Backorder (Cb) and Shortage costs (Cs). That's because during then, it virtually holds no stock. The most important discovery made here is that EKCS becomes TKCS once it has base stock (or dispatched kanbans). But this is difficult to spot especially when their schematics look so different. The results have also evinced the strength of the pure kanban system, the TKCS over BS. Hence managers using BS should consider upgrading to TKCS to save cost in all scenarios.

Air Traffic Management of an Airport Using Discrete **Event Simulation Method**

Maurizio Bevilacqua¹, Filippo Ciarapica², Giovanni Mazzuto¹, Leonardo

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This study aims to show an approach to model and solve the airport congestion problem, through the use of a discrete event simulation software. After analyzing the operation of an airport, we modelled it in a discrete event system, in order to carry out, through simulation software Simul8, a prediction of the behaviour of such a system, varying conditions and parameters. In particular, we wanted to study, in terms of economic benefit, the option of airport expansion. Therefore we examined the expansion hypothesis to 2 and 3 tracks of a single-runway airport, so to evaluate the economic convenience of any new situation, based on the relative change in total cost of the flight queue.

Insertion Loss Analysis of Perforated Panel Muffler Using Finite Element Method with Equivalent Fluid Model

Jingxiang Li¹, Shengdun Zhao¹, Kunihiko Ishihara²

¹Xi'an Jiaotong University, China

²The University of Tokushima, Japan

Acoustic finite element method is normally employed to predict the attenuation characteristics of mufflers such as perforated panel mufflers which are widely used to reduce the pneumatic noise generated by exhaust air flow. Assuming the perforated panel as an equivalent fluid to establish the specific acoustic impedance, the meshing is simplified for improving the computational efficiency. Furthermore, experiments measure the insertion loss of a kind of muffler with double layers of cylindrical perforated panels, and certify the validity of the proposed equivalent fluid method comparing with the classical Sullivan and Crocker model.

Personnel Selection System Framework Research

Zhengsheng Han¹, Hongyan Dui¹, Shudong Sun¹ ¹Northwestern Polytechnical University, China

Based on the personnel selection problem drawn from a university in China, this paper proposes a technology roadmap using Bayesian network, reliability and importance measure. Three key technologies are analyzed. First, extracting the features of the personnel selection for one university, an extended Bayesian network model framework is introduced and the basic properties of model are analyzed. Second, the evaluation method of the reliability of the personnel selection system is gave using the universal generating function (UGF) and the key factor of the personnel selection system are sketched based on the importance measures. Third, the framework of the multi-objective optimization of the key factor is described. This provides theory basis and technology support for personnel management.

From Individual Creativity to Team Creativity Liqun Wen¹, Mingjian Zhou¹, Qiang Lu¹ ¹Harbin Institute of Technology Shenzhen Graduate School, China

The literature of team creativity assumed that whether a team is creative depends on how creative its individual members are. But the question has not been confirmed yet. This paper identified the individual creativity as team leader's creativity and team members' creativity and examined the issue of how individual creativity affects team creativity.

Application of Affective Engineering in the Opening and Closing of Sport Utility vehicle Tailgates

Taebeum Ryu1

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The effort in opening and closing a tailgate of sport utility vehicles is an important factor of affective quality. This study aims to analyze the effort and satisfaction of customers in the opening/closing of SUV tailgates with related mechanical characteristics. A total of 100 participants evaluated their effort and satisfaction in opening/closing the tailgates of 42 SUVs. A mixed-factor analysis of variance was conducted to determine the significant mechanical properties of tailgates that affect effort and satisfaction. The effort and satisfaction in closing tailgates was found to be affected by three properties of the force-angle graph of tailgates: middle force, maximum force more than initial force, and range of angle of steady force. Tailgate opening was found to be affected by two properties: initial force and entire angle range of the force-angle graph. Subjective effort and satisfaction in the opening/closing of tailgates were modeled statistically based on these significant properties.

The Impact Study of Transformational Leadership Style on **Organizational Success**

Akechai Judkrue¹

¹Assumption University of Thailand, Thailand

The exploratory study describes the influence of transformational leadership (TL), the latest and most promising phase in the evolutionary development of leadership theory, organizational success. This research demonstrates the impact of four characteristics of TL, namely Individual Consideration (IC), Intellectual Stimulation (IS), Inspirational Motivation (IM), Idealized Influence (II), on organizational success through different factors. The researcher identified nine factors, including Organizational Vision, Goal Settings, Team Work, Organizational Commitment, Empowerment, Communication, Innovation, Motivation and Task Performance, which represents independent variables in the research

model. The conceptual framework was developed based on secondary data, i.e. conference papers, journal papers, online databases, etc. and eventually verified by primary data, through survey data from the employees of Multi-National Companies (MNCs) of Bangkok, Thailand. Research findings would unlock further frontiers for organizational key personnel to obtain effective and fruitful decisions in order to develop successful organizations.

The Effect of Online Service Failures on Consumer Repurchase Intention Basing on Mainland China Online Retailing

Junfeng Liao¹, Linlin Zhong¹

South China University of Technology, China

The research focuses on the issue of service failures in online shops, and its effect on customer repurchase intention. Basing on the theories of marketing and psychology, this paper proposes the concept of perceived service failure, analyzes the relationship among perceived service failure, perceived loss, perceived service quality, satisfaction, trust and repurchase intention.

Exploring the Intention of Customers to Use Innovative Digital Content Information Technology

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Differing from previous works, this study explores the critical factors affecting the intention of a customer while using innovative digital content information technology in a retail store. Based on the literature of Technology Acceptance Model (TAM), this study proposes to construct a test model and adopts structural equation modeling (SEM) to test the model. All data collected from 101 customers were used to evaluate the proposed model. Based on our test results, we found that all path relationships are significant in the hypothesized model. Thus, the results of this study strongly support feedback and operations interface simplification as factors that can affect intention to use innovative digital content information technology.

New Formal Approach To Project Critical Buffer

Tomasz Blaszczyk¹, Pawel Blaszczyk²

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²University of Silesia, Poland

This research focus on the problem of modeling and optimizing the time-cost trade-offs in project planning problem with taking into account the behavioral impact of planned human resources. As a distinct from the original Goldratt conception and heretofore research results and known applications we proposed an approach taking advantage not only from task duration overestimations, but primarily from overestimations of amounts of work expected to its completion. Proposed problem description contains both safe and reasonable amounts of work estimations. At the recent stage of research we introduced the influence factors matrix with the possibility of flexible resources assignment. The model uses a mechanism of motivating the resources through the creation of bonus fund from the pool of savings. Theoretical considerations are illustrated by the numerical example.

Investment Decisions on the Case Industrial Port BOT Project

Tyrone T. Lin¹, H.C. Su¹

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This paper, by practicing the method of build-operate-transfer to rent an industrial port, aims to analyze the feasibility of the financial investment project and to supervise the uncertainty of a long-term operation period by leading different financial rates. It is the key point for the win-win among the government, the case company, and the industry. Whether the model evaluation works or not depends on the internal rate and the return method. The analysis on investment and the cost of capital rate differ on the project feasibility and on how to construct a proportion; on the other hand, the capital contribution rate and self-compensation rate provide a reference for the project.

A Trimming Design Method for Product Innovation

Yao-Tsung Ko¹, Ping-Hong Kuo¹

¹Tunghai University, Taiwan

This paper proposes a systematic innovation approach by integrating the function analysis and trimming method into the conceptual design activities of new product development (NPD). Concept design is considered to be one of the pivotal phases in NPD process which has a significant impact on downstream NPD activities such as ideas selection and detail design. Despite the recognized importance of concept design, there is a lack of a systematic and effective problem solving process that covers all concept design activities. To address this gap, the authors develop a systematic approach to product concept design based on the problem-oriented concept. Also, the authors provide a case example to demonstrate the effectiveness of using this method in NPD context, and further illustrate some implications through the managerial perspective.

Multi-project Planning and Optimisation for Shipyard Operations

Allan Nengsheng Zhang¹, B. Ma¹, D. Loke², S. Kumar², Y. Y. Chan² ¹Singapore Institute of Manufacturing Technology, Singapore ²Astoria Consulting Pte Ltd, Singapore

Shipyards are operated by projects. Effective project planning is critical for shipyards to compete for business in a complex and time-constrained environment. This paper addresses some pain points in planning and optimisation work at shipyards and presents a solution developed based on Microsoft Project Server for managing and optimising the deployment of critical resources so as to maximize the project profits. It discusses the methods for identifying the critical chain for multiple projects, and optimising their makespans with constrained resources using overtime and outsourcing strategies. Initial results are finally presented to showcase the viability and efficiency of the solution.

Research on Jiangsu PV Solar Industrial Cluster Upgrading Driven by RJVs

Lan Chen¹. Bo Wu²

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²Hehai University, China

As economy develops, environmental degradation and resource crisis have become prominent. Under this situation, this paper chooses the PV solar industrial cluster as the research topic. Existing literature shows that RJVs are an effective form of cooperated R&D and play a great role in promoting technology advancement. This paper is based on the RJVs theory. We analyze the status of Jiangsu PV solar industrial clusters and find that low value added and excessive reliance on foreign markets are challenging the clusters. It is viable to form RJVs in order to solve these problems.

Exploring the Impact of Patent Expenditures on **Performance: Evidence from Chinese Stock Market**

Xin Li1

¹Chongqing University of Technology, China

This paper examine whether firms' patent investment leads to performance. Unlike the previous studies, this paper employs patent expenditures measures of patent indicator. Our results show that prior patent expenditures have a positive effect on firms' current and the next 2 years performance. This paper also finds that the relation between patent expenditures and performance is shown to be much stronger when the performance is measured by market indicator than when the performance is measured by accounting indicators.

Leader's Values, Abusive Supervision, and Employee Performance: A Theoretical Model

Xiaoli Wen1, Chunhua Chen1

¹South China University of Technology, China

Leader's values play a key role on the leadership effectiveness. The study of leader's values on the abusive supervision is scare by now. Based on the theories of leader's values and abusive supervision, this paper considers the relationship among leader's values, abusive supervision and employee performance, proposes a new theoretical model and corresponding propositions. In this theoretical model, abusive supervision mediates the relationship between leader's values and employee performance. Finally, the paper gives some suggestion on the future research.

Research on the KMS for Small and Medium Manufacturing Enterprises based on ASP and CSP

Huiyu Huang¹, Jianying Luo¹, Zhicong Zhang¹ Dongguan University of Technology, China

In the light of the knowledge management problems which exist in SMMEs (small and medium manufacturing enterprises) of China, an application model of KMS for SMMEs based on ASP (Application Service Provider) and CSP (Cloud Service Provider) is put forward in this paper, and its structure and superiority are analyzed. Then the construction scheme of KMS for SMMEs based on ASP and CSP is studied: the platform architecture is expounded in detail, as well as

the development model and major implementation technique of the platform are explained in brief. For making full use of their respective advantages of ASP, ISV (Independent Software Vendor) and CSP and taking full account of the feature of SMMEs, this system and application model have the characteristics of convenient, flexible, economy, efficiency. This research has a certain practical significance to promote the application of KMS in SMMEs.

Temporal Network Analysis of Emerging Technologies: Topic Transition in World Wide Web (WWW) Conferences

Kazuma Arino¹, Takao Furukawa¹, Nobuyuki Shirakawa¹, Kumi Okuwada¹

¹National Institute of Science and Technology Policy, Japan

This paper proposes the use of temporal network analysis of conference sessions to examine the evolutionary process of emerging technologies as significant information for strategic R&D decision-making. This study examines the emerging processes of rapidly growing web based technologies by analyzing World Wide Web (WWW) conferences over the latest decade. Temporal networks are demonstrated through scientific and technical streams relating Social Network and Monetization. In particular, the transition from E-community in 2006 to Social Networks in 2008 strongly affects later research. Monetization originates from the Auction and E-Commerce session in 2002 and is derived from Advertisements & Click Estimation and Sponsored Search. The conference session titles can be considered as conceptualized meta-knowledge created by the scientific community. The proposed method has the advantage of not requiring any prior knowledge in conceptualization compared to bottom-up clustering techniques used in citation analysis and text mining.

Knowledge Asset-based Three-stage Model of Innovative Enterprises Evolution

Yunmei Wang¹, Chunlin Si¹, Fan Xia¹, King-Lien Lee²

¹Fudan University, China

²National Taipei University of Technology, Taiwan

Innovative enterprises achieve sustainable competitive advantages by means of innovation instead of anything else. During this process, knowledge assets and the value-adding activities related always play a fundamental role which changes in accordance with the evolution of sustainable competitive advantages and results in the evolution of different business models of innovative enterprises. Based on the analysis of these correlative changes, the knowledge-based three-stage model of innovative enterprises evolution is proposed. Basically, it illustrates the development of innovative enterprises from technology management, to innovation management, and to intellectual property operation. At each stage, the types of knowledge assets and core value-adding activities are summarized and the according business model of innovative enterprises is suggested respectively. The hypotheses are further testified with a case study of Baosteel Group Corporation in China and the policies for incubating innovative enterprises are suggested thereafter.

Modelling Ontology for Supporting Human Resource Planning Process

Rohayati Řamli¹, Mohd. Noah Shahrul Azman¹, Mohd Yusof Maryati¹ Universiti Kebangsaan Malaysia, Malaysia

Manpower planning is complex and demanding task, because in establishing the factual insights of an enterprise, one is required to have the in-depth knowledge of forecasting manpower planning and practices, as well as the knowledge of macroeconomics of the particular business involved. Inconsistency information and lack of knowledge during decision-making process could generate to inaccurate decision. In addition, massive amount of information in unstructured forms need to be managed into a systematic manner. The aim of this research is to develop a generic ontology-based architecture for supporting manpower planning and proves the effectiveness of integrating information extraction from diverse source in supporting information for manpower forecasting. Ontology is built to capture and structure domain expert knowledge based on criteria and preferences for selecting manpower forecasting adjustment. Currently, the framework is under development as a research prototype.

Patent Portfolio Efficiency Using Data Envelopment Analysis: Case of Wind Power Market

Rahul Kapoor¹, Matti Karvonen¹, Tuomo Kassi¹ Lappeenranta University of Technology, Finland

Predicting the success of emerging industries is difficult due to the uncertain response of markets and mixed nature of technological signals. In order to ensure success, firms attempt to block competitors through patents or achieve standardization of their technologies. This paper uses Data Envelopment Analysis to measure the efficiency of patent portfolios held by firms in the wind power market. The value indicators are measured using the case firms' patent data from the EPO worldwide PATSTAT database. The value indicators are then used as outputs to measure the relative efficiencies of the patenting firms. These indicators can be used by technology managers to assess the quality of patents, thus providing a basis for patent pricing and licensing. The results can help investors determine the future success of firms in the uncertain environment of emerging industries. R&D managers can benefit by evaluating the strengths and weaknesses of their patent portfolio.

Study of Supplier Support through New Product Development in System Integration Industry - Comparison of Case Studies based on Different Product Newness

Min-Sun Wuang¹, Kuei-Fei Yang¹ ¹Fu Jen Catholic University, Taiwan

This study takes different degrees of product newness as a focus for examining both new and upgrade products as variable factor, as well as the issues and support involved in new product development. Six cases are used to analyze supplier support application. The study shows that enterprises should seek different degrees of support from suppliers when facing different technical and non-technical problems. Regarding technical issues, for really new products it is argument setting of supplier support; for upgrade products it is argument setting of supplier support. Regarding non-technical issues, for really new products these refer to planned applications of supplier support; for upgrade products these refer to planned applications of supplier support.

Impact of Passionate and Charismatic Leadership on Creativity and Innovation within SMEs

Wilson Maladzhi¹, Bingwen Yan¹, Oluwole Daniel Makinde¹ ¹Cape Peninsula University of Technology, South Africa

Since South Africa's political transition in 1994, the business community was overwhelmed due to dynamic customer demands, organizational changes, increasing globalization and competition. Additionally, traditional leadership approaches still dominant in the current transformational dispensation. Lack of innovative leadership resulted in deprived employees an opportunity to be creative and innovative. This study analysed the impact of passionate and charismatic leadership on creativity and innovation culture within the Small Medium Enterprises (SMEs). A structured questionnaire was employed for data collection. A group of employees (n=367) from 50 SMEs in the Western Cape were involved. The findings indicated that some key leadership characteristics did not impact on creativity and innovation culture positively in these SMEs. Both passionate and charismatic leaders lacked innovative nature. We suggested that leaders should enforce the spirit of teamwork and build up trust and loyalty among employees, make efforts in R&D while maintaining transformational style. This will foster creativity and innovation culture for long term sustainability.

Analysis of RFID Technology on Controlling Shrinkage and Anti-counterfeiting in Luxury Industry

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²South China University of Technology, China

Motivated by radio-frequency identification (RFID), it has been heralded as a major breakthrough to enhance the efficiency of a supply chain. This paper aims to explore the prospects of RFID investment value in luxury market, by mainly focusing on the optimal investment strategies, in order to optimize ordering quantity and maximize the profits. We compare two scenarios in a three-level supply chain involving a manufacturer, a distributor and a retailer. Each scenario is developed for two situations under conditions with or without the implement of RFID. According to the luxury consumption psychology of consumers and the luxury market characteristics, we mainly consider the case of inventory shrinkage and try to effectively control the issues of mis-categorization, theft and anti-counterfeiting. Finally, we present numerical analyses. Therefore, the research of RFID application in this paper has important theoretical value and great practical significance.

The Service Science Practice Research: A Proof of Service Concept on i236 Project in New Taipei City

Hung Chih Lai¹, Yao Cheng Yu², Kae Kuen Hu², Hui Shan Kuo²

¹Shih Chien University, Taiwan

²National Taiwan University, Taiwan

The process of proof of concept (PoC) plays an important role in service implementation. In the past, studies on proving ground were limited in a small area with uncompleted scenarios, so the experience of service and marketing activities could not be duplicated completely to an another area. This study employed a case study, through Far Eastern Group's experimental service in Banqiao district of New Taipei City, to provide some empirical service design and implementation concept driven by the methodology of the INSIGHT Center of National Taiwan University. The essay was found out the methodology was useful to carry out some parts of the process first. It was also exposed problems of coordination with different stakeholders, such as lack of communication, too short time to cooperate smoothly even in the same enterprise group, and so on. The PoC challenges firms' structures and implies firms need more powerful top-down and bottom-up communication..

The Evaluation of Enterprise Manufacturing Services **Maturity Model**

Hao Li¹, Yangjian Ji², Xinjian Gu², Guoning Qi² ¹Zhejiang University, Zhengzhou University of Light Industry, China ²Zhejiang University, China

As the profit of manufacturing enterprise reduces, the transformation of development mode becomes urgent. The implementation of Modern Manufacturing Services (MMS) helps to improve the enterprises' profit, and becomes one of the best ways for enterprise transformation. The implementation of MMS needs a model to evaluate the enterprise's current service development phase. This paper firstly puts forward an Enterprise Manufacturing Services Maturity Model (EMSMM), which contains four phases and two levels. Then, this paper gives evaluation methods for service phase and service level. Finally, a Chinese transformer enterprise implements the MMS and adopts the methods put forward in this paper. The result shows that the EMSMM can provide effective scientific decision-making and support.

Ten Steps in Mixed Engineering Education and Training

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Traditional teaching methods are curriculum-centered such as single subject, product oriented, isolated teaching and learning and standards driven. It seemed teacher-centered and lacked of interaction of learners. This research listed all the advantages of curriculum-centered and learner-centered. Through experience sharing in mixed engineering education, the experts can discuss with each other and create more innovational training ways in the future.

Bilingual Teaching Practices of "Quality and Reliability Engineering" Course

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This paper summarizes the practices in teaching the undergraduate bilingual course "Quality and Reliability Engineering". Main attempts are outlined, and the feedbacks from the students taken this course are analyzed. Based on the teaching field observation and analysis outcomes of the feedbacks, the main achievements obtained from the course learning and the aspects for improvement are identified. The main conclusions are (a) teaching efficiency and effectiveness can be considerably enhanced by incorporating the teaching of subject knowledge with application of professional English and Excel, (b) the learning interest of students can be considerably excited by inquiry-based learning and introduction of more real-world illustrations, and (c) sufficient after-class training is important for ensuring the teaching quality.

An Empirical Study on Influencing Factors of Consumer Behavior of Engineering Insurance

Li Dong¹, Yan-ling Liu¹

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Based on the theory of planned behavior, a structure equation model was set up to study how consumption environment, perceived value and insurance consciousness of engineering insurance affect the consumption intention and consumer behavior. The model results showed that the consumption environment, perceived value, and

insurance consciousness of engineering insurance exhibit a significant positive correlation with consumption intention. Further, the consumption intention of engineering insurance positively correlated with consumption behavior. All the results support the theoretical model and are in agreement with all hypotheses. At the end, management enlightenments derived from the model results were presented.

Evaluating the Reliability of Infrastructure Networks by Resilience Analysis

C.Y. Lam1, K. Tai1

¹Nanyang Technological University, Singapore

Infrastructure networks are highly interrelated to the prosperity, security, economy, and public health of the modern world. As such, any disruption in the infrastructure network poses a significant damage to society, therefore this paper presents a resilience analysis approach to evaluate the reliability of infrastructure networks so as to quantitatively determine the ability of a network to cope with complexity under disruption as well as to develop foresight in safety management. Under resilience analysis, an infrastructure network is modeled as an undirected graph with nodes and edges, and the resilience of the whole network can then be evaluated by the weighted sum of the resilience of all the reliable independent connection paths between all pairs of nodes. The proposed approach is also illustrated in a portion of a rail network, and the results indicate that the ability of the network to cope with complexity under disruption can be explicitly known.

Visionary Leadership as a Catalyst for Innovative Culture

Bingwen Yan¹, Wilson Maladzhi¹, Oluwole Daniel Makinde¹

¹Cape Peninsula University of Technology, South Africa

Innovation culture is relatively at a slow pace in South Africa compared to other countries. Leadership plays a critical role in creating an innovation culture within orgainsations. Due to globalization, uncertainties, technology, lack of skills and innovative leadership style, many orgainsations are struggling to survive firmly. This study was aimed to develop an innovative model by applying the key characteristics of visionary leadership to create an innovation culture in Small and Medium Enterprises (SMEs). A comparative analysis covered both employees (n1=366) and leaders (n2=56) from a group of SMEs in the Western Cape. A Likert scale questionnaire was designed for data collection. The relationship between employees and leaders regarding the visionary leadership characteristics were tested. The results showed significant impact of leadership on innovation within SMEs. However, it is further revealed that leaders should enhance their leadership styles by bringing employees to become future orientated towards innovation.

Extra-cluster Knowledge Search and Innovation Performance: An Empirical Study Based on Industrial Cluster Firms from Yangtze River Delta in China

Ru-yan Hong1, Jianmei Miao2

¹Zhejiang University, Hangzhou Normal University, China ²Hangzhou Normal University, China

In an open innovative system, cluster firms in technologically lagging countries need especially establish linkages with extra-cluster knowledge sources in order to help them achieve and sustain innovation and avoid 'entropic death' of the cluster. This paper examines the association between the extra-cluster knowledge search of cluster firms and innovative performance. Based on a sample of 156 industrial cluster firms from Yangtze River Delta in China, the empirical results show that breadth of extra-cluster knowledge search is curvilinearly (taking an inverted Ushape) related to innovative performance. Search depth is linearly related to performance. Moreover, absorptive capacities positively moderate the relationship between knowledge search breadth and innovative

A Study of Regional Distributions and Dissimilarity Measures for Multi-Scale Nonlinear Structure Tensor in **Texture Segmentation**

Shoudong Han¹, Yong Zhao¹, Wenbing Tao¹

¹Huazhong University of Science and Technology, China

To represent the orientation and scale differences of texture images effectively, multi-scale nonlinear structure tensor (MSNST) has been recently proposed to extrac1t the texture features in our previous research [1]. In this paper, we extend the choice of regional

distributions for MSNST, and express the statistics for the different definitions of dissimilarity measure. We claim and demonstrate that the choice of regional distributions and dissimilarity measures is a nontrivial task which has a deep impact on the texture segmentation. The influences of them are experimentally compared and analyzed based on the kmeans clustering method and Graph Cuts framework. Experiments using a large number of synthesized texture images and real natural scene images demonstrate the superior segmentation performance of Gaussian Mixture Model (GMM) distribution with Riemannian measure.

Research on Project Portfolio Management of Product Development based on 3D Visualization

Angang Wei¹, Gang Zhao¹, Changyu Chen¹, Fei Wang¹

Beihang University, China

Applying Portfolio management into product development would be helpful to utilize and manage overall resources effectively and improve production efficiency. In this paper, a three-dimensional visualization method of project information is proposed for the display, query, analysis and decision-making of project portfolio information. The paper presents the application of the method in the process of project portfolio management of product development and introduces the implementation process of a real project portfolio management

Research of Idea Generation Process for Fuzzy Front End Based on Patent Analysis

Jing Guo¹, Ping Jiang¹, Jingwei Guo¹, Runhua Tan¹ ¹Hebei University of Technology, China

The product innovation is a topic of enterprise development, and FFE (fuzzy front end) is a key stage of the product innovation. With the development of FFE study, the enabling techniques of product innovation (such as TRIZ, theory of constraints, unexpected discovery and so on) took the role of innovation idea generation for fuzzy front end. In order to help enterprise realize its own technical strength and the competitive situation, the paper proposed the research process of idea generation for FFE based on patent analysis. Patent documents contain rich information, we can get some innovation ideas through the research and analysis of these information. Finally, we take the screw pump for example to verify

Virtual Human Emotional Behavior Model based on **Neural Network**

Na Ren¹, Tingting Zhao¹, Hongjiang Wang¹, Rongxue Zhang¹, Wenqiang Zhang¹, Nan Zhang¹

¹Shenyang Institute of Engineering, China

the feasibility of this method.

Virtual human emotional behavior model is the key technology of intelligibility of virtual actor in behavior simulation. A virtual human emotional model based on neural network is proposed in this paper. This work is on the basis of virtual visions which calculate the feature vectors of images through pixel extraction. After learning in neural network, the virtual human can act emotional behavior properly according to his inside feeling and the object attitude toward him. Finally, experiments proved this virtual human emotional behavior model based on neural network applicable and effective.

Research on Image Matting Technology Based on Image **Edge Detection**

Rongxue Zhang¹, Tingting Zhao¹, Renna ¹, Hongjiang Wang¹

Shenyang Institute of Engineering, China

There are still many problems, especially the coordination between edge detection accuracy and anti-noise performance, although the traditional image edge detection method has been greatly developed. In this paper we propose a key technique based on image edge detection algorithm which adopts the Canny operator to accomplish the job of edge detection and foreground object extraction from the perspective of image processing, also has been compared with other detection methods. The experimental results show that this algorithm is able to raise the sensitivity of foreground object extraction evidently in comparison with some traditional image edge detection methods.

Session Decision Analysis & Methods (4)

Date Wed, 12 Dec Time 11:00 - 12:30 S221 Room

Chairs Jin Han Park, Junzo Watada

Factors for the Introduction of RFID on the Distribution

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The purpose of this paper is to comprehensively understand the important level of each factor and objectively select the key factors that influence the adoption of Radio Frequency Identification (RFID) by the distribution industry (including logistics and retailing) in Taiwan. The fuzzy analytic hierarchy process (FAHP) is utilized to find the weighting of each factor, based on opinions of RFID alliance members, including the distribution industry and RFID solution providers. It is hoped that the research results can provide a reference for the distribution industry in terms of their focus on better allocation of resources to form appropriate strategies, which will improve success rates, when adopting RFID.

Decision Evaluation for Damage Evaluation and Prevention Analysis in Bank Operational Risk Management

Aron Larsson¹, Sara Vickman¹

¹Mid Sweden University, Stockholm University, Sweden

Operational risk is defined as risk concerning the company's processes, people and systems including both external and internal events. SAFOR (Systemic Approach Framework for Operational Risk) is a novel, holistic, and module based framework approach for the management of operational risk aimed for banks. This framework involves a component for damage evaluation and prevention (the DEEP method) where the utilization of methods from the area of interval decision analysis is proposed as a candidate building block. The DEEP method is a semi-quantitative approach to risk management, including identification of risks, selection of mitigating options, and the follow-up of actions taken. In this paper we assess the DEEP method in the context of SAFOR. The DEEP method relaxes the requirement for knowledge on frequency of risk events and affirms that answers are logically achieved. At the same time, it makes the understanding of how preventive measures are selected a bit exclusive.

Evaluating GHG Components using Artificial Intelligence: Connection Weight Approach

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

The obligation to control the fast increase of emitted greenhouse gas (GHG) for world climate change reduction is the duty of all countries. The significance of the contributing factors to GHG emission, i.e., fuel factor, intensity, economic structure and activity is investigated. Connection weight approach of artificial neural network (ANN) was employed for this study. This paper quantifies the variables responsible for the GHG emissions over the period 1990 – 2000 in the industrial sectors of Canada. It was discovered that activity effect was the main determinant of the GHG emissions with fuel factor the least significant. The investigation should give a clue to policymakers on how to reduce GHG emissions.

The AHP-based Decision Making on Innovation Trajectories in Public Research and Development **Organisations**

Pawadee Meesapawong¹, Yacine Rezgui¹, Haijiang Li¹¹*Cardiff University, United Kingdom*

Executive staff of public research and development (R&D) organisations worldwide are continuously faced with the challenge of exploring several innovation trajectories to attain their vision. The decision making in this paper is reliant on the Analytic Hierarchy Process (AHP) conducted in a case study drawn from Thailand, an example of a developing country where public R&D dominates the research landscape in science and technology. The AHP study provides a set of innovation factors as the criteria to meet the goal of selecting the highest impact plan on innovation factors. The findings reveal that the plan focusing on commercial orientation has higher

impact than the plan focusing on societal orientation. However, given that the selected case study is a tax payer funded public R&D organisation, the societal expectations have to be factored into its innovation plan. A sensitivity analysis was therefore employed, which indicated potential for a mixed orientation considering both the commercial and societal orientation plans.

An Optimal LED Allocation System Based on Multilevel Integer Programming Method

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²National Cheng Kung University, Ťaiwan

A light-emitting diode (LED) light bar for display monitor may be composed from thousands feasible LED combinations due to supplies of LED bins featured by voltage, illumination, and chromaticity. To control inventory levels by bins, this work proposes a novel multilevel linear programming based system capable of maximizing LEDs allocations of light bar work orders. Filtering from feasible LED combinations by the control table based operations, the target LED bins enable solving of each programming model by levels efficiently. A case study in the TFT-LCD industry demonstrates that the proposed system can control inventory levels of the remaining LED bins and reduce more than 70% of the original computational loads, allowing allocation of LEDs for work orders in mean 1.73 min.

Analyzing Consequences of Diabetes Mellitus Using Intuitionistic Fuzzy Set

Sujit Das¹, Samarjit Kar² ¹Dr. B.C. Roy Engg. College, India ²National Institute of Technology Durgapur, India

Diabetes is a chronic illness which may lead to several major consequences in future like Vision Loss, Heart Failure, Stroke, Nerve Damage and Foot Ulcer. There is no exact cure of diabetes, as a result prevention and self-education is the only way to deal with it. In this article we propose to analyze the consequences of diabetes mellitus using intuitionistic fuzzy set. Using hamming distance and similarity measurements this article has investigated the consequences which may appear for a patient. We have proposed an approach using entropy to analyze the result and ensured that the results are correct. Also using entropy measurement it is scrutinized that some consequences have almost no chances to appear.

Effects of Buyers Capacity Limitation in an Integrated Lead Time Controllable Consignment Stock Inventory System

Huizhi Yi1, Bhaba Sarker

¹Louisiana State University, United States

This paper aims to enable the decision maker of an integrated vendor-buyer system, under Consignment Stock (CS) policy, to make the optimal/sub-optimal production/replenishment decisions where the buyer places a space limitation to the vendor and the lead-time is controllable with an extra investment. Because the developed models are mathematically very difficult to solve, three doubly hybrid meta-heuristic algorithms are employed to solve the models. The computational results show that one of these three algorithms works very well both in the sense of the success rate and the mean CPU time. The analysis of the computational example also reveals the quantitative effects the buyer capacity limitation may have to the annual joint total expected cost (JTEC) of the integrated system.

Session Human Factors (1) Date Wed, 12 Dec Time 13:30 - 15:00 S221 Room

Chairs Seng Fat Wong, Jia-Hua Lin

Assessment of Architectural and Physical Factors in Human Resources Performance in Project-Oriented Organizations

Mona Foroozanfar¹, Mahmood Golabchi¹, Saied Yousefi¹ ¹University of Tehran, Iran

This paper presents a forensic research about evaluating the impact of architectural and physical factors on the performance of human resources in project oriented organizations. The objective is to study how design and planning of working areas can influence the human resources performance. In order to achieve this objective, two stages are presented: analytical and statistical. In the analytical stage (Sections I, II, II), human resources performance, related literature and schemes, and then criteria of office work are briefly studied. In the statistical approach, surveys are carried out and the resulting outcomes are discussed using five graphical representations. This systematic approach would result in a rationally persuasive and theoretically justifiable guideline that can practically be used to improve the efficiency of human resources performance and management.

Effects of Load-Carrying Postures and Gender on Postural **Sway** Xingda Qu¹

¹Nanyang Technolgoical University, Singapore

The objective of this study was to identify how load-carrying postures and gender affect postural sway. Eight males and eight females (19-30 years old) participated in the study. The participants were instructed to look straight ahead and stand upright on a force platform as still as possible with feet together. A 10-kg load was carried in three different postures during upright stance: anterior load carriage, lateral load carriage, and posterior load carriage. Objective postural sway measures and subjective ratings of postural stability were used to assess balance control behaviors. Experimental findings suggested that lateral load carriage appeared to be more stable than anterior and posterior load carriage, and the females might have higher fall risks than males when carrying external loads. Practical implications and limitations of the study were discussed.

Study on Construction and Implement of User Model in Turret Display and Control System

Kan Zhang¹, Qing Xue¹, Minxia Liu¹, Qiqi Yin¹

¹Beijing Institute of Technology, China

To meet the personalized needs of different users during the mission, user-oriented adaptive human machine system has been put forward in this paper. It is presented quaternary interaction user model and fuzzy comprehensive evaluation method for the establishment of user experience model. Quaternary interaction user model, which adequately considers "human" "machine" interaction character, can more roundly reflect characteristic for users using an adaptive system. The basic idea and process of fuzzy comprehensive evaluation method in detail has been introduced in this paper. Finally, an example to validate has been given. It is tested that the sorting algorithm has superior usability and provides a new approach for model construction in adaptive human machine interface.

Human-computer Interaction Analysis of Turret Based on Context-Aware

Li-Ying Feng¹, Qi-qi Yin², Li-tao Wang¹, Qing Xue² ¹Zhuhai Campus Beijing Institute of Technology, China

²Beijing Institute of Technology , China

Human-computer interface of turret currently is not friendly enough because of the mobility, styles of input and output limitations and computing ability. But contexts of human-computer interaction are not considered comprehensive in the process interface design. Therefore, it's vital for the operational efficiency to import a way of human-computer interaction for interface based on contextaware, which could have a good usability to enhance the users' performances and satisfactions. The paper explored the category of turret contexts and the context awareness, then presented a brief overview of the context fusion in military field and illustrated its potential through an example used in turret.

The Comparison of Ergonomics Postures Assessment Methods in Rubber Sheet Production

Panya Wintachai¹, Nivit Charoenchai¹

¹Chiang Mai University, Thailand

The aim of this work is to study and compare the postural assessment by using Rapid Upper Limb Assessment (RULA), REBA (Rapid Entire Body Assessment) and Ovako Working Analysis System (OWAS) methods. According to the working process, 25 operators (18 males and 7 females from the north-eastern of Thailand) working in 9 processes, it can be seen that most working postures were repetitive and the workstation caused uncomfortable working conditions. The first step of the research is to record working postures by camera and then the hazardous postures were assessed by RULA, REBA and OWAS. The results of the study showed that working postures in rubber sheet production contained high RULA, REBA and OWAS scores.

A Paper Prototype Usability Study of a Chronic Disease Self-management System for Older Adults

Da Tao1, Calvin Or1

¹The University of Hong Kong, Hong Kong

To increase the usability of a new chronic disease self-management system, we conducted a usability study of the system among older adults with chronic diseases (n=33) using a paper prototype based on the think-aloud approach. The metrics used to judge system usability were the task incompletion rate, task completion time, frequency of error, frequency of help, satisfaction, perceived usefulness, and perceived ease of use. We also interviewed the participants to elicit their comments on the system design. The quantitative data were analyzed using descriptive statistics, and the interview data were content analyzed. Overall, the participants were able to carry out the self-management tasks with the current design, but several usability problems were discovered with the system navigation, information search and interpretation, information presentation, and readability. The paper prototype study enabled us to identify these system design weaknesses and to make suitable recommendations for design modifications.

Property of Worker Allocation Optimization with Two Professional Workers in Limited-Cycle Multiple Periods

Xianda Kong¹, Jing Sun², Hisashi Yamamoto¹, Masayuki Matsui³

¹Tokyo Metropolitan University, Japan

²Nagoya Institute of Technology, Japan

³Kanagawa University, Japan

In this paper, we deal with an assembly line with limited-cycle multiple periods with two kinds of workers. Skills of workers are assumed to be different. We consider an optimization problem for finding an allocation of workers to the line that minimizes total expected cost satisfying the demand. Then we propose a theorem of the property of the optimal worker allocation and discuss the other properties in conditions.

Session Human Factors (2) Date Wed, 12 Dec Time 15:30 - 17:30 S221 Room

Chairs Xingda Qu, Saied Yousefi

Applied Human Factors Engineering in Advanced Carriage **Design of Mass Transport System**

Seng Fat Wong¹, Qili Chen¹ ¹University of Macau, Macau

Applied human factors engineering technology in carriage design of mass transport system (MTS) can enhance ride comfort level and reduce disorder problems for the passenger. However, scientific and systematic measurement that applied human factors engineering methodologies for carriage design is incomplete on the contemporary studies. This paper covers the scientific and systematic measurement that applied human factors engineering methodologies for sitting and stand up posture in the simulated carriage of MTS. The main contributions of this study are to achieve the posture and force analysis by the simulation of HumanCAD and the further analysis and validation by the experiments under the simulated lateral vibration for the carriage model with anthropometry and FSA pressure mapping system. The solutions and recommendations of advanced carriage design are concluded with human factors engineering analysis.

Managerial Compensation and Earnings Management: From the Managerial Overconfident Perspective

Jing Sun¹, Xiaofeng Jv¹, Yanmin Peng¹, Yue Chang¹

1Harbin Institute of Technology, China

This paper exams the relationship between managerial compensation status and earnings management preferences, by sampling Chinese non-financial listed A shares. The study shows that companies with higher managerial compensation status tend to adopt more earnings manipulation in both accruals and real activities. We also find that companies tend to adopt real activity earnings management, if managers have the absolutely compensation advantage in internal management.

A Study and Survey on the Service Condition of Barrier-free Facilities in the Transportation System with **Ergonomic Evaluation**

Seng Fat Wong¹, Lili Zhong¹, Weng Keong Chan¹, Weng Hou Leong¹, Kin Seng Ho1

¹University of Macau, Macau

This paper mainly conducts a study and survey on the service condition of barrier-free facilities in the transportation system. It is applied the ergonomic technology that including Forces Sensitive Application (FSA) pressure mapping system, electronic hand dynamometer, HumanCAD, and questionnaire survey to do the evaluation. The evaluation is focused on the elder and wheelchair user. The results can contribute to reduce the disorder problems for elder by the portable pedal design when the elder enters the vehicle. Moreover, the results of ergonomic analysis can scientifically find out the sitting posture problems for wheelchair users in ordinary vehicle and special designed vehicle.

Association of Visual Abilities, Motor Skill and **Anticipation Responses on Parking Performance**

Bor-Shong Liu¹, Hsien-Yu Tseng¹, Tung-Chung Chia², Tsung-Yen Ho¹, Yu-Ho Chen1

¹St. John's University, Taiwan

²Ling Tung University, Taiwan

The purpose of present study was to examine the association of visual abilities, motor skill and anticipation responses on parking performance. Results of analysis revealed that higher correction between time of backward vertical parking and parallel parking. The negative correction had found between range of visual field and time of forward vertical parking. Subjects have wider visual field as better performance of forward vertical parking. Furthermore, high correction had found between time of arm stabilimeter test and time of backward vertical parking, parallel parking. In addition, results of binary logistic regression analysis found that there are two interaction factors associated with performance of parallel parking, i.e. arm stabilimeter by curving path and mirror tracing. Errors times of arm stabilimeter by curving path and errors times of mirror tracing could be predicted the performance of parallel parking. Thus, stabilimeter test and electrical-mirror tracing test could be recommended for predicting driving abilities.

An Airworthiness SHELL Model for Aircraft Maintenance

Tsun Tat Wong¹, Sun Tong¹

¹Hong Kong Polytechnic University, Hong Kong

It is widely accepted that human errors rather than technical failures have the greatest potential to adversely affect contemporary aviation safety. In order to have a better understanding of how human factors and errors in aircraft maintenance may contribute to an aircraft accident/incident, a new human factor classification scheme, the A-SHELL Model (Airworthiness-Software-Hardware-Environment- Liveware), has been developed. Based on airworthiness regulations, the generic human factor model is aimed to identify less-than-satisfactory interactions between various components of the system and the aircraft maintenance staff. In the model, airworthiness has been incorporated to bind all the crucial SHELL Model elements together. The purpose is to provide a better compliance with airworthiness regulations, which in turn would enhance aviation safety. This paper outlined the impact of human factor on airworthiness compliance in aircraft maintenance and an application of A-SHELL model is demonstrated through a case study.

The Mediating Impact of Ergonomics Between Existing Safety Culture And Targeted Safety Culture Amongst Safety And Health (SH) Practitioners Rozlina Md Sirat¹, Awaluddin Mohamed Shaharoun ¹, Norhayati

Zakuan¹, Syed Abdul Hamid Syed Hassan²

¹Universiti Teknologi Malaysia, Malaysia

²Ministry Of Human Resource, Malaysia

The aim of the current study is to investigate the perceptions of Safety and Health (SH) practitioners on ergonomics importance at workplace and its influence to safety culture. The study is important to show the role of ergonomics as mediating factor between existing safety culture practice (ESCP) and targeted safety culture practice (TSCP). A survey was done using a sample of 108 SH practitioners in Malaysian manufacturing companies. Confirmatory Factor Analysis (CFA) is used to statistically test a priori theoretical assumptions against empirical data. A model was suggested and was modified using modification Index. Seven hypotheses have been investigated. The finding discovered that there was a lack of relation between how people practiced safety and what an ideal safety practice should be. In the Malaysian scenario, the ESCP does not significantly influence the TSCP. However, the existence of beliefs on importance of ergonomics at workplace significantly can influence the TSCP. This implies that ergonomics should be seen as an important agenda in safety culture activities in order to inculcate target safety culture by 2020.

Ergonomics Effects of Work Pace And Work:Rest Ratio on **Repetitive Powered Handtool Operations**

Jia-Ĥua Lin¹, Raymond McGorry¹, Rammohan Maikala¹ ¹Liberty Mutual Research Institute for Safety, United States

Repetitive power tool use is associated with work-related upper extremity musculoskeletal disorders. Using a pneumatic nutrunner, 21 men completed twelve 360 repetitive fastener-driving sessions on three joints (hard, soft, and control) at slow and fast pace, and two different work:rest patterns. Handgrip force, hand motion, and localized blood volume at the forearm were collected throughout each session. For the control joint, the mean grip force exerted was 39.6% of maximum voluntary exertion (MVE) whereas during hard and soft joint sessions it was 48.9% MVE and 56.9% MVE, respectively. Further, a greater grip force decrease was resulted while operating soft and hard joints as compared to the control joint, suggesting considerable upper extremity muscular effort. Fast work pace resulted in higher average grip forces by participants but a greater decrease in the force as the session progressed. Providing rest breaks reduced perceived exertions. The findings provide knowledge for assembly task design to reduce the hand/arm injury risks.

Causing Mechanism Analysis of Human Factors in the Marine Safety Management Based on the Entropy

Haiyan Wang¹, Tingting Dai¹

¹Wuhan University of Technology, China

The unsafe behavior has been generally recognized as the main reason of marine accidents. How to control and reduce the accident in the maritime safety management resulted from human factors is a prompt problem to be solved. This article analyzes the marine safety management system from the viewpoint of safety system engineering, and divides the human factors into personal factors and organizational ones, and the vulnerability theory of complex system based on the entropy is applied to analyze the cause mechanism of human factors and a causing mechanism model of human factors is established. It is concluded that the vulnerability relationships among vulnerability elements including man, machine and environment subsystem in ship safety management system is completely vulnerability relations, namely the collapse of any subsystem will affect the other subsystems

Session Operations Research (4)

Date Wed, 12 Dec Time 11:00 - 12:30 S222

Room

Chairs Tatsushi Nishi, Kiyoshi Sawada

Investigating Sensitivity of Multi Response Optimization

Nitendra Gautam¹, Om Prakash Yadav¹, Bimal Nepal²

¹North Dakota State University, United States

²Texas A & M University, United States

Design optimization dealing with several responses or quality characteristics simultaneously has been a major issue within manufacturing industry. The conflicting nature of these responses makes design optimization task more challenging and complex. Several approaches have been suggested over a period of time but are found highly sensitive to subjective input parameters such as weight and target assignment. This paper investigates the effectiveness of existing multi-response optimization approaches in dealing with subjective input parameters and correlation among responses. The paper further proposes a simple and practical method which is highly robust to subjective input thus addressing these

Comparing Two Proposed Meta-Heuristics to Solve a New P-Hub Location-Allocation Problem

Ali Ghodratnama¹, Reza Tavakkoli-Moghaddam², Armand Baboli ³

¹University of Tehran, Iran, INSA-Lyon, DISP Laboratory, France

²University of Tehran, Iran ³INSA-Lyon, DISP Laboratory, France

This paper presents a sophisticated mathematical model, in which the location of hubs is fixed and their capacity is determined based on facilities and factories allocated to it. În order to feed the client's nodes, different types of vehicles of different capacities are considered, in which the clients are allocated to hubs, and types and numbers of vehicles are allocated to the factory's facilities. To come up with solutions we propose to use two meta-heuristic algorithms, particle swarm optimization and simulated annealing. The efficiency and computational results of these algorithms are compared with one another.

Real Options Between Three Asymmetric Firms

¹Tokyo Metropolitan University, Japan

This paper examines the strategic investment timing problem in the case of three firms with different cost structures. We extend the strategic investment timing problem by allowing the number of asymmetric firms to range from two to three. Surprisingly, we show that the firm with the lowest cost structure is not always the first investor in the investment timing problem with three asymmetric firms. The mechanism of strategies in the case with three asymmetric firms is quite different from that with two asymmetric firms.

Modeling Fixed-Sequence Multi-Stage News Agency for Efficient Message Total System Time

Abdullah Abdul Jabbar¹, Nashat Fors¹, Seraj Abed², Sherif Rabia¹

¹Alexandria University, Egypt

²King Abdul Aziz University, Saudi Arabia

News making is characterized by a complex and dynamic workflow, in which it is important to produce reliable news as fast as possible. Usually, the workflow of news making consists of many stages including Interpreting. Each stage consists of many stages with specific processing procedures. The proposed study describes a novel multicriteria optimization framework for deriving optimal number of processors in the Interpreting division to achieve efficient, timesaving and low-cost operation of the system. The task of interpreting division is formulated as an optimization problem of sequencing jobs in a fixed-sequence, considering the total set up cost and total tardiness penalty per hour as the criteria for optimization. The application of the proposed framework has been discussed on a practical case of a news agency. In view of its (INLP) nature, Computational experiments could not assure optimum solutions Instead, efficient solutions of the objectives are presented.

Use of Shrinkage and Grouping Approaches to Forecasting Seasonal Demand

Kui Zhang¹, Pengyi Gao², Ziwu Long¹ ¹Wuhan Polytechnic University, China

²Huazhong University of Science & Technology, China

This paper extends the study of seasonal forecasting techniques by combining James-Stein shrinkage estimator with one of group estimators in different ways. In order to discover the conditions under which the combination has advantage over original shrinkage or group methods, this study is focused on the examination of two key parameters: variance of random component and cross correlation between different series. Through a simulation experiment designed for the examination of the parameters, the performance of seven estimators for seasonal forecasting is evaluated. The conclusions finally deliver the guidelines for the choice of the best estimators under a given set of conditions.

DEA Sensitivity Analysis on the Factors Responsible for Industrial Energy Consumption: Case Study on the Canadian Industrial Sector

Oludolapo Olanrewaju¹, Adisa Jimoh¹, Pulek Kholopane²

¹Tshwane University of Technology, South Africa

²University of Johannesburg, South Africa

Energy consumption efficiency is a function of several input variables governing the consumption patterns or behavior. The degree to which efficiency responds to these variables and/or combination thereof will give insight into strategies or ways to better manage energy consumption within an industry. This paper endeavors to evaluate the operation of Canadian industrial sector between year 1990 to 2000, based on data from 15 Canadian industries using Data Envelopment Analysis (DEA). The overall operation is analyzed, and sensitivity analysis is used to appraise the role/relevance of various input factors and their combination thereof.

Arbitrage and Spread in FX market: an Extended Glosten and Milgrom Model

Ming Ma¹, Yufei Zhang²
¹Beijing Institute of Technology, China ²Renmin University of China, China

Based on the arbitrage index developed in [6], the paper analyzes the impact of information asymmetry on bid-ask spreads in FX market. Unlike the classical models established in [3] and [5] whose main focus is informational asymmetry induced by private channels, this paper focuses on the asymmetry induced by differences of analytical power. Those who have private information might still suffer from noise trader risks before the true value is finally realized. However, arbitragers won't. Hence, the arbitrage index established in this paper as a measure of average arbitrage opportunity should be positively correlated with bid-ask spreads.

Session Operations Research (5)

Date Wed, 12 Dec **Time** 13:30 - 15:00

Room S222

Chairs Om Prakash Yadav, Reza Tavakkoli-Moghaddam

Optimal Pricing and Lot-sizing for Fresh Produce and Foods with Quality and Physical Quantity Deteriorating Simultaneously

Yiyan Qin¹

¹Guangxi University for Nationalities, China

A significant amount of models has been proposed to investigate the deterioration inventory. However, most of models assumed that a fixed physical quantity of items deteriorates over time, the quality of items does not decay before their expiration dates. In fact, the quality and physical quantity of many products, including fresh produce and food, deteriorate over time. In this paper, we consider the pricing and lot-sizing problem for products with quality and physical quantity deteriorate simultaneously. The deterioration rate of quality and physical quantity is taken to be time proportional. The theory for finding the optimal solution of problem is discussed and a numerical example is given.

Online Dispatching of Rail-Guided Vehicles in an Automated Air Cargo Terminal

Wuhua Hu¹, Jianfeng Mao¹

¹Nanyang Technological University, Singapore

A problem of dispatching rail-guided vehicles (RGVs) for completing transportation requests arises in an automated air cargo terminal. The problem involves transportation requests as appear dynamically in a stochastic manner and aims to minimize total travel distance of each RGV. This work presents a model and a preliminary solution approach for the problem with a single RGV having unit capacity. Computational studies performed on randomly generated instances are used to evaluate the approach, and the performance is compared with that of a priority-based approach which mimics the one used in practice.

Maximizing the Total Weight Value of Just-In-Time Jobs in Identical Parallel Machines with Periodic Time Slots

Eishi Chiba¹, Takao Kageyama¹, Yoshiyuki Karuno², Hiroyuki Goto¹ ¹Hosei University, Japan

²Kyoto Institute of Technology, Japan

We address the processing of jobs in an environment with periodic due dates. Every job must be completed exactly on a due date, the situation of which shall be referred to as just-in-time. Each job is associated with a weight which is non-increasing with time. The problem we address is to maximize the total weight of just-in-time jobs. We prove that this class of problem is NP-hard. The key idea is a reduction from the Hamiltonian path problem, known as strongly NP-hard. Moreover, we discuss some special cases where the problem is solvable. If no set-up times exist, there are cases where the problem is solvable, we then present a method to solve the problems. To achieve this, we derive partition and union procedures, and use network flow algorithms.

A New Lagrangian Decomposition and Coordination Approach for Energy Portfolio and Production Planning for Multiple Companies

Eiji Sekiya¹, Tatsushi Nishi¹, Masahiro Inuiguchi¹

¹Osaka University, Japan

The energy portfolio and production planning problem for multiple companies under energy constraints is formulated as a mixed integer nonlinear programming problem. A new Lagrangian decomposition and coordination approach is proposed to solve the problem effectively. In this paper, we propose efficient computation algorithms for lower bound and upper bound. The lower bound is computed by relaxing the nonlinear term in the objective function. The upper bound is derived by Lagrangian relax and fix heuristic that successively fixes the solution of subproblems to create a feasible solution. Computational results show that the proposed method can effectively solve the problem compared with conventional Lagrangian decomposition and coordination method.

Maximum-Profit Rooted Not-Necessarily-Spanning Tree Problem

Eishi Chiba¹, Yusuke Abe¹, Toshiki Saitoh², Takao Kageyama¹, Hiroki Koga¹, Takashi Kobayashi¹, Hiroyuki Goto¹

¹Hosei University, Japan

²Kobe University, Japan

Given a connected undirected graph, one root vertex, non-negative income for each vertex including the root vertex, and non-negative cost for each edge, we aim to find a rooted tree for which the total profit is maximized. Such tree is known as not-necessarily-spanning. This problem can be applied to various real-life situations. We first prove that this problem is strongly NP-hard. The key idea is a reduction from the uncapacitated facility location problem known as strongly NP-hard. We then present three heuristic algorithms to solve the problem. Finally, we show some computational results using these three algorithms and compare the results in terms of both the objective function value and computation time. The algorithms yield good performance on approximation ratio.

An Optimal Model for Adding Relation to an Indirect Subordinate in a Linking Pin Organization Structure

Kiyoshi Sawada¹

¹University of Marketing and Distribution Sciences, Japan

This paper proposes an optimal model for adding relation to a linking pin organization structure where every pair of siblings in a complete K-ary tree of height H is adjacent such that the communication of information in the organization becomes the most efficient. For a model of adding an edge between a node with a depth M and its descendant with a depth N, we formulated the total shortening distance which is the sum of shortening lengths of shortest paths between every pair of all nodes and obtained an optimal depth N* which maximizes the total shortening distance for each value of M.

MTS Lead Time Uncertainty Study in Periodic Review MTS-MTO System

Feng Yu Wang¹, Kajesh Piplani², Laura Xiao Xia Xu³, Amrik Singh Bhullar³ ¹Singapore Institute of Manufacturing Technology, Nanyang Technological University, Singapore

²Nanyang Technological University, Singapore

³Singapore Institute of Manufacturing Technology, Singapore

Joint MTS-MTO system is well recognized because a) it supports postponement well in manufacturing, and b) it can lower the cost by taking advantage of economy of scale in MTS and satisfy high product variety by taking advantage of flexibility in MTO. However, there is a lack of decision support in parameter control for fully exploiting the potential benefits. In this paper we assess the impact of the uncertainty of MTS production lead time and provide the insight of the impact of MTS production lead time and its variation. The simulation results show that with current inventory policy structure the service-related costs, such as late delivery and order rejection cost are insensitive to MTS production lead time and its variation. However, the reduction of MTS production lead time can considerably reduce inventory holding cost. Further study is needed for validating the results after an "optimal" inventory policy is obtained.

Session **Engineering Education and Training**

Date Wed, 12 Dec Time 15:30 - 17:30

S222 Room

Chairs Kem Ramdass, Hon Keung Yau

Research on Foundation and Practice of 123 Modes in **Professional Engineer Education Training Plan**

Wang Jinghua¹, Zhou Jun¹, Li Jing¹, Yang Zehui¹, Zhang Xinguang¹ ¹Ningbo University of Technology, China

Over the past 30 years as a whole, China has become one of fastest growing countries in the field of economy at the same period with a 9% GDP growing rate, offering demand space for engineering technical talents with high international qualities. However, the engineering technical talents with high qualities cannot be supplied. In the background of "professional engineers plan" of the Ministry of Education, as one of the 61 demonstration universities in china, Ningbo University of Technology takes the lead in the important reform Plan of engineering education by "123 Modes". This mode focuses on cultivating Industrial, Initiative and Integrative Engineers. The foundation and practical approach of "123 Modes" are introduced in this paper.

Improving Capacity for Engineering Systems Thinking (CEST) among Industrial Engineering Students

Sigal Koral Kordova¹, Moti Frank¹

¹Holon Institute of Technology, Israel

Systems education and training should become an integral part of the academic curriculum design. This paper presents an undergraduate course aimed at developing students' capacity for engineering systems thinking (CEST). The course is based on executing projects in teams. The students' CEST prior to and at the end of the course was assessed by addressing and measuring four components: cognitive characteristics, abilities, personal traits, and knowledge. The data collected in this study was used to analyze the four above-mentioned components of CEST. The Analysis of Moment Structures (AMOS) program was used to analyze the collected data; the general data analysis approach, known as Structural Equation Modeling (SEM), was also implemented. The research findings allow us to conclude that the final project contributed to the development of three out of four CEST components among learners.

Management Model to Certification and Recertification **Criteria to Professional Engineers**

Oscar Alejandro Vasquez Bernal¹, Felix Antonio Cortes Aldana² ¹UNAD, Colombia

²National University of Colombia, Colombia

The objective of this project is to establish a management model for certification and recertification of professional engineering, which is required to perform the analysis of the state of knowledge of the processes of certification and recertification of professional engineering and the different studies where the relationship University - Company - State has been applied to generate results based on innovation. The scope of the project will involve the analysis of regulatory, legal and procedural in Colombia, United States, Canada, El Salvador, Guatemala and Honduras, countries through which they have established free trade agreements, where the issue of mobility is essential development of skills that result in professional innovation. Develop a management model which involves the relationship University - Business-State will result in a unified methodology in the regulatory framework for certification and recertification of professional engineering.

Analyzing International Scientific Collaboration Pattern for China by Using ESI Database

Dan Xiang¹, Huaxing LI¹
¹Northwestern Polytechnical University, China

The importance of international scientific collaboration has increased, and this is most marked for China as a rising economy. This paper looks into Chinese international scientific collaboration from co-authorship at the international level by using data of ESI highly cited papers. Special attention is given to collaboration with the established economies. It first introduces the definition of association rules, and then provides the dataset for further analysis. We find that USA is the top one collaborator in China's highly cited papers; Germany, England, France are China's top three EU partners; Japan and Australia are top two Asian collaborators. The analyses also suggest that Chinese internationally co-authored papers have a higher citation than its domestic papers. The most collaborated fields with its main partner countries are also explored.

Externalization Of Knowledge In Indian Higher Education Through Increase In Research Publications

Kalyan Kumar Bhattacharjee

¹Indian Institute of Technology, India

Purpose: The purpose of this paper is to identify the key areas of knowledge management in relation to knowledge externalization through growth of research publication in Indian Institutes of higher learning.

Methodology: Quantitative data collected from SCOPUS and INDEST database has been imported and analyzed using MS-Excel. Last 5 to 15 years of publications data has been used in this paper. A comparison has been drawn between top Indian Institutes (like IITs, IISc) and 3-4 top foreign institutes from the countries having large number of publications and the SAP-LAP framework has been used to analyze the KM status.

Findings: This paper identifies critical causes behind lack of knowledge externalization in Indian context which are insufficient research publications, less emphasis on the existing Indian literatures in terms of referencing, less emphasis on latest research publications and inadequate patenting etc.

Towards Modeling Manufacturing Flexibility Information in Metalcasting SMEs

Rhythm Wadhwa

¹NŤNU, Norway

Flexibility can be defined as the ability to respond efficiently to the changing demands of the customer and is different in SMEs (Small-to-Medium manufacturing Enterprises) than the traditional OEMs (Original Equipment Manufacturers). The presented work focuses on flexible manufacturing design problem on a systems level and aims at providing a common data structure as a reference for different methodologies and tools in this area. The developed framework translated into a relational database, has been interfaced with the main phases of the systems design in the metalcasting industry. A UML diagram has been developed to represent a method for modeling the product, process and quality within a flexible and scalable framework. The proposed framework could have a wider applicability since it is based on shared standards and previous general frameworks.

Experience - An Essential Component to Improve the Confidence in Using Technology For Learning: An Empirical Study in Hong Kong Higher Education

Hon Keung Yau¹, Alison Lai Fong Cheng²

¹City University of Hong Kong, Hong Kong

²Hong Kong College of Technology, Hong Kong

The purpose of this study is to investigate the difference between students with more experience and students with less experience on the confidence in using technology for learning in Hong Kong higher education. A survey methodology was employed and 211 questionnaires were collected in a Hong Kong university. The finding shows that students with more experience are found to have more confidence in using technology for learning than students with less experience.

Applying Fuzzy MADM Approach for the Selection of **Technical Institution**

Victor Gambhir¹, N.C. Wadhwa¹, Sandeep Grover², Sanjeev Goyal²

¹Manav Rachna International University, India ²YMCA University of Science & Technology, India

Selection of a technical institution is a complex task as it involves many tangible and intangible factors, which are difficult to quantify. Moreover, this problem becomes much more important as the whole professional life of the student depends upon this. With the change in higher education policy in 1991, lots of technical universities came into existence in India. Although many agencies, provide these ranking but these seems to be biased one. Therefore, an endeavor has been made in this paper to provide mathematical model to rank the technical institutions by using Fuzzy MADM approach. Fuzzy logic helps to quantify the intangible factors and Graph Theoretic and Matrix Approach (GTMA) gives single numerical index based upon which different technical institutions can be compared easily. This will save lot of time and will give confidence to both technical institutions and students.

Session Supply Chain Management (4)

Date Wed, 12 Dec Time 11:00 - 12:30 S223

Chairs Tsan-Ming Choi, Amr Eltawil

Fuzzy Power Stream Mapping to Measure Dominating Power in Supply Chain

Anirban Kundu¹, Vipul Jain¹

Room

¹Indian Institute of Technology Delhi, India

This paper presents a Fuzzy Power Stream Mapping (F-PSM) framework to measure dominating power and inter-organizational dependence in a supply chain relation. In this proposed framework, the 5 bases of power by French and Raven [9] are integrated into Power Stream Mapping (PSM). The 5 bases of power are considered as control variables and are presented by fuzzy numbers. The proposed framework establishes relation between dominating power and the performance of supply chain. The distinctive outcome of the framework is denoted as the Relative Power Index (RPI) with respect to performance of a supply chain player. A measure of dominating power for each individual player in the supply chain network is also proposed. The Agile Vulnerable (AV) link of power stream mapping has been developed. The proposed framework is illustrated with an empirical example.

Developing a Web-based Collaborative Forecasting Platform to Support Tourism Supply Chain Management

Xinyan Zhang¹, Haiyan Song¹
¹The Hong Kong Polytechnic University, Hong Kong

Tourism is a networked industry where clusters of organizations coordinate, cooperate, or compete in a dynamic environment. Therefore tourism industry is well suited to the concept of the supply chain. It is believed that applying supply chain management strategy to the tourism industry provides a new research opportunity to generate insights into how a tourism supply chain (TSC) develops a sustainable competitive advantage, especially when the demand uncertainty is high. Along this line, this paper is aimed at developing a Web-based platform for TSC members to conduct collaborative forecasting. Unlike the traditional stand-alone forecasting process in which individual tourism practitioners produce demand predictions based on their private or partial information, collaborative forecasting breaks down the "island of analysis" and involves reliance on TSC partners to provide specific and timely information on important derivers of future demand. Specific designs of the collaborative forecasting platform are proposed in this paper, and this includes the user classification, forecasting method selection, and platform structure design.

Determination of Size of Supply Base under Uncertain **Cost Information**

Jishnu Hazra¹, B. Mahadevan¹

¹Indian Institute of Management, India

We analyze a situation involving suppliers who differ from one another with respect to the cost of capacity. The buyer in our model does not have complete information on suppliers' cost structure and the buyer's demand is also random. We first derive the reservation price a supplier is expected to quote in the competitive online bidding process for obtaining a contract. Subsequently we determine, from the buyer's perspective, the capacity to be procured through a contract and the optimal number of suppliers to be awarded the contract. Our numerical analysis suggests that the supply base is relatively stable under different scenarios; it is only the contracted quantity that varies. Our results also reveal that the buyer is likely to source from multiple suppliers even though the lowest cost supplier may have sufficient capacity and is reliable.

A Quantity-Flexibility Contract in Two Periods with Supply Chain Coordination

Xin Li1, Zhaotong Lian1, Wenhui Zhou2 ¹University of Macau, China

²South China University of Technology, China

We study a quantity-flexibility supply contract between a manufacturer and a retailer with two periods. The retailer can get a discount within a fixed quantity and adjust the quantity at the end of the first period. The retailer can adjust the order quantities after the trial period based on updated demand forecast information and inventory status by paying a higher per-unit cost for the incremental units or giving up the deposit. By developing a two-period dynamic programming model in this paper, we first obtain an optimal replenishment strategy for the retailer when the manufacturer's price scheme is known. Then we derive an proper pricing scheme for the manufacturer by assuming that the supply chain is coordinated. The numerical results show some managerial insights by comparing this coordination scheme with Stackelberg game.

Stochastic Demand Fulfillment Model with Multiple **Demand Classes: Using Revenue Management**

Wen Yang¹, Richard Y. K. Fung² ¹City University of Hong Kong, China ²City University of Hong Kong, Hong Kong

This paper considers a demand fulfillment problem for multi-class customer orders in a finite horizon period. Demands and replenishment of supply in different periods are random variables that are independent of each other. The objective is to maximize expected net profit over the planning horizon by deciding the fraction of the demand to fulfill. A stochastic dynamic model is presented and analyzed to establish the existence of the optimal fulfillment policies. In the end, a numerical example illustrates the results by using dynamic programming method.

Virtual Depot Approximation for the Transshipment Problem

Dmitry Krass¹, Oleksandr Shlakhter¹

¹University of Toronto, Canada

In the transshipment problem a number of retailers facing stochastic demand must place orders before the demand is known, but can transship inventory once the demand is realized. Recently developed simulationbased algorithm [1] provides near-optimal solutions, but can only handle small-to-medium problems. We develop an approximation-based approach where all transshipments are routed through a virtual depot. This allows us to reduce the solution time by orders of magnitude, while maintaining high solution accuracy, making it possible to solve realistic-size problems to optimality.

Session Supply Chain Management (5)

Date Wed, 12 Dec Time 13:30 - 15:00

Room S223 Chairs Vipul Jain, Charles Mbohwa

Ranking of Automotive Supplier Selection Criteria in Pakistan: An AHP Approach

Fikri Dweri¹, Sharfuddin Ahmed Khan¹ ¹University of Sharjah, United Arab Emirates

Supplier selection is considered as an important factor for the success of any industry. The global competition and increasing growth of market demand increased the need for organizations to identify and select appropriate suppliers in order to fulfill customer demands on time with high quality and in cost effective manner. This paper will identify the supplier selection criteria for automotive industry in Pakistan and rank these criteria using Analytical Hierarchal Process (AHP).

Modeling the Macro-environmental Influences: An International Logistics View

Supachart lamratanakul¹, Bordin Rassameethes², Vatcharapol Sukhotu³, Sununta Siengthai³, Voratas Kachitvichyanukul³, Ravi Shankar⁴ ¹Kasetsart University, Asian Institute of Technology, Thailand

²Kasetsart University, Thailand

³Asian Institute of Technology, Thailand ⁴Indian Institute of Technology, India

The study is intended to understand macroenvironmental influences on international logistics. Transportation and inventory for international distribution especially in South East Asia was also examined to identify environmental factors on international logistics. The study applied a comprehensive discussion with an expert panel and "Bibliometrics" methodology to identify six environmental Ultimately, factors on international logistics. macroenvironmental factors refer to the uncontrollable forces and conditions influencing an organization. Later, the interpretive structural modeling (ISM) was employed to study the relationship among those factors to distinguish which factors are the most challenges for the international logistics. MICMAC analysis was finally employed to set the level of driving and dependence power among the factors. The results of the study provide the systematic model that explains the relationship among six environmental factors on international logistics. The political, economic, and cultural influences become the most challenge in which international trade specialists should be concerned vigilantly.

Information Security in Supply Chains - A Process Framework

Arup Roy¹, A.D. Gupta¹, S.G. Deshmukh²

¹Indian Institute of Technology Delhi, India

²ABV Indian Institute of Information Technology & Management India

The key motivator behind information security is the management of business risk and regardless of whether that risk is financial or not, organizations mitigate vulnerabilities in the enterprise to reduce the threat to both reputation and customers. This paper discusses some aspects related to information security in supply chains and then proposes a Process Framework for the management of information security in the supply chain. The Framework should help supply chain managers collaborate with information security and IT specialists to establish, implement and operate their Supply Chain Information Security Management System.

A Modeling of Retailers Pricing in Advance Selling Based on Fairness and Reciprocity

Junfeng Li1, Shuping Yi1 Chongqing University, China

This paper studies pricing of advance selling from retailers to customers. There is a problem which is tradeoff between the retailers' profit margin and customers' payoff in distribution fairness and reciprocity. We build a model of retailers' utility with distribution fairness theory. We analyze retailers pricing in two cases, and try to seek an optimal price for maximizing retailers' profit margin. Then we propose that the parameter of reciprocity affect pricing in fairness context. In our model of retailers pricing in advance selling, retailers can find optimal price or baseline price.

A MILP Model and Heuristic Approach for Supply Chain Network Design with Minimum Volume Constraints

Mouna Kchaou Boujelben¹, Celine Gicquel², Michel Minoux³

¹LGI Ecole Centrale Paris, France ²Universite Paris 11, France

³Universite Paris 6, France

We consider a supply chain network design problem arising from a case study in the automotive industry. The introduction of minimum volume constraints in the related facility location problem leads to numerical difficulties when solving large-sized instances. We thus develop a heuristic solution approach based on the linear relaxation of the original mixed integer linear programming formulation of the problem. The results of our computational experiments show that the proposed method provides good quality solutions within short computation times.

Academic Supply Chain Management for Tertiary Educational Institutions

Bishwajit Banik Pathik¹, Md. Mamun Habib¹ ¹American International University-Bangladesh (AIUB), Bangladesh

This exploratory study addresses academic supply chain management which consists of educational supply chain and educational management as the major constituents of ITESCM (Integrated Tertiary Educational Supply Chain Management) model for the universities. ITESCM Model structures were defined and 493 respondents, confirmed by representing university administrators of leading tertiary educational institutions around the world, faculty and staffs, employers, and graduates. The resulting model was subsequently evaluated for accuracy and validity by multiple linear regression (MLR) analysis and structural equation modeling (SEM) technique. The redesigned model is the revised form of original ITESCM, that would be easily understandable and research equations are more user friendly for practical field applications. The research model and equations provide a novel approach for prospective investors or current administrators of the universities to review and appraise their performance toward fulfillment of ultimate goals, i.e. producing high-competent graduates and significant research outcomes for well-being of the society.

Session Supply Chain Management (6)

Date Wed, 12 Dec Time 15:30 - 17:30 S223

Room

Chairs Mahdi Bashiri, Carman Ka Man Lee

A Group Genetic Algorithm for the Fleet Size and Mix Vehicle Routing Problem

Michael Mutingi¹, Charles Mbohwa² ¹University of Botswana, Botswana

²University of Johannesburg, South Africa

In supply chain management and logistics, the use of vehicles to distribute products from suppliers to customers is a major operational activity. In transportation, optimizing the routing of vehicles is crucial for providing cost-effective services to customers. This research addresses the fleet size and mix vehicle routing problem (FSMVRP), where the heterogeneous fleet and its size are to be determined. A group genetic algorithm (GGA) approach, with unique group genetic operators, is designed and implemented to solve a number of existing benchmark problems. The approach demonstrates competitive performance, in terms of cost and computation time, when compared to other meta-heuristics.

Optimizing Replenishment Policy for Deteriorating Item Considering Inventory Dependent Demand, Inspection and Imperfect production

Chun-Jen Chung¹

¹Aletheia University, Taiwan

Different from traditional production quantity model, a production-inventory deteriorating (PID) model in supply chain are studied considering just in time (JIT) delivery, inspection, the imperfect production and warranty policy. Effects of inventory dependent demand and the relationship among inspection, product design and warranty are also investigated. An example is used to illustrate the PID model. The sensitivity analysis shows that the holding cost, fixed demand and the unit inspection cost are the important factors in controlling the deteriorating inventory model.

Integrated Supplier-Buyer Inventory Model with Optimal Reorder Point, Controllable Lead Time, and Service Level Constraint

Yosi Agustina Hidayat¹, Suprayogi Suprayogi¹, Sifa Islam¹, David Try Liputra²

¹Bandung Institute of Technology (ITB), Indonesia

²Maranatha Christian University, Indonesia

This paper considers a two-echelon supply chain inventory problem consisting of single supplier and buyer. In the system under discussion, the supplier produces a product and supplies it to the buyer facing a stochastic demand condition. Buyer's lead time is controllable that can be shortened at an added cost. In addition, all shortages are backordered. A model is formulated for an integrated supplier-buyer problem to simultaneously determine the optimal order quantity, reorder point, lead time, and number of shipments from the supplier to the buyer during a production cycle. Instead of having the shortage cost in the objective function, a service level constraint is included in the model. The objective function is to minimize the total expected cost of the system. An algorithm is developed to obtain the optimal solution and a numerical example is also included to show the results of the proposed model.

New Approaches for Analyzing the Logistical Synchronization of Material Provision in Production Networks

Patrick Prussing¹, Sven Baumgarten¹, Georg Ullmann¹ ¹Institute of Integrated Production Hannover gGmbH (IPH), Germany

In order to obtain high logistical performance in a production network at low logistical costs, there has to be a high level of synchronization in the material provision of the final assembly. The level of synchronization can be restrained by dynamic effects in a network. This paper presents an approach for identifying critical material procurement processes that are accountable for an insufficient achievement of logistical goals in the material provision. In addition, the results of a simulation study are explained that analyzes the effects of measurements conducted to increase the synchronization of the material provision by also taking dynamic effects into account.

An Optimization Based Decision Support Model for Thai Rubber Industry Supply Chain: Preliminary Results

Janya Chanchaichujit¹, Mohammed Quaddus¹, Martin West¹, Jose

¹Curtin University, Australia

As today's global rubber markets continue to be more complex in term of cost, the objective to design effective rubber supply chain needs to address this challenge. Therefore, this paper aims to develop an optimization based decision support model for the Thai rubber industry formulated by incorporating the distribution, production and transportation of rubber products in a manner to minimize the total costs. The purpose of the model is to support the analysis of rubber supply network flows, the factory locations, the outbound distribution of transportation mode and route choices. Preliminary results based on cost minimization objective are presented and discussed.

Modeling an Industrial Strategy for Inventory-Distribution Coordination of Telecom Operators in China: the 'Consignment Stock' Case

Tianjian Yang¹, Yujia Fan¹, Xinzhe Wang¹ ¹Beijing University of Posts and Telecommunications, China

A modeling framework that considers inventory-distribution coordination and consignment stock policy is proposed. The model is applied to determine the optimal stock policy and examine the potential benefits of consignment stock policy. Numerical results show consignment stock policy is profitable and leads to inventory consolidation.

A Bi-objective Stochastic Programming Model for a Green **Supply Chain with Deteriorating Products**

Zeinab Šazvar¹, S.M.J. Mirzapour Al-e-Hashem², Armand Baboli ³, M.R. Akbari Jokar⁴, Yacine Rekik⁵

Sharif University of Technology, Iran, INSA-Lyon, DISP Laboratory, France Emlyon Business school, INSA-Lyon, DISP Laboratory, France

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5Emlyon Business School, France

Nowadays consumers and legislation have pushed firms to design their activities in order to reduce more and more the negative environmental impacts. The objective of this paper is developing a mathematical model and proposing a new replenishment policy in a centralized supply chain for deterioration items considering non linear holding cost. In this model, we consider inventory and transportation cost, as well as the environmental impacts under uncertain demand and partial backordered demand assumptions. Several transportation modes, producing various GHG level are considered. The best transportation modes and replenishment policy are determined by balancing between financial and environmental criteria. In this way, we develop a linear mathematical model and present a numerical example from real world to discuss more details about proposed model. Then, by doing the sensitivity analysis, some managerial insights are proposed and finally more promising directions are suggested for future research.

An Order Splitting Policy for Deteriorating Products with Non-linear Holding Cost under Stochastic Supply Lead

Zeinab Sazvar¹, M.R. Akbari Jokar², Armand Baboli ³

¹Sharif University of Technology, Iran, INSA-Lyon, DISP Laboratory, France ²Sharif University of Technology, Iran

³INSA-Lyon, DISP Laboratory, France

The strategy of pooling lead time risks by splitting replenishment orders among multiple suppliers simultaneously is an attractive sourcing policy especially in unreliable supply environments. Whereas various assumptions are considered in order splitting models developed, researchers tend to overlook an important inventory category in order splitting models, called deteriorating items. In this paper we develop an order splitting model for a retailer which offers a deteriorating product under stochastic lead time. For modeling the deterioration process, a non-linear holding cost function is considered. The inventory system is modeled as a continuous review system (s, Q). We then solve an example taken from the literature to show the effectiveness and applicability of the proposed model. Finally, by doing some sensitivity analyses for the key parameters of the model, single and split sourcing policies are compared under different conditions and some managerial insights are proposed.

Session Quality Control & Management (3)

Date Wed, 12 Dec Time 11:00 - 12:30 S224 Room

Chairs Chen-ju Lin, Samuel Bassetto

Customer Value Creation through Product Quality and Customer Usage of Product Functions: Managing the **Industry Shift towards Smartphones**

Bjoern Frank¹, Boris Herbas Torrico¹, Takao Enkawa¹

¹Tokyo Institute of Technology, Japan

This article investigates how the industry shift from traditional cell phones to smartphones has impacted the process of customer value creation and thus caused the rapid demise of industry leaders and the rise of new global leaders. It explores this mechanism within the chain from quality-induced and customer-co-created product functionality via hedonic, symbolic, and utilitarian customer value to customer loyalty. Based on consumer data from Bolivia and Japan, the study illustrates that the greater market success of smartphones than traditional cell phones can mainly be explained by higher hedonic and symbolic value creation. This additional value creation is caused by higher product quality and greater opportunities for customers to co-create value through active usage of customized product functions.

A Simple Method on Power Calculation in Experiments for **Treatment Comparison**

Huairui Guo¹, Pengying Niu¹, Ferenc Szidarovszky¹ ¹ReliaSoft Corporation, United States

Power calculation is a very important topic in design of experiments (DOE). When designs are balanced, calculating the power is straightforward and existing formulas can be found in many published resources. However, not much research has been done for unbalanced design, especially for experiments with qualitative factors. In this paper, we first clearly define what "power" is and then propose a method for calculating the power of qualitative factors in experiments designed for treatment comparison. The proposed method can be applied to both balanced and unbalanced designs. Due to the complexity of obtaining exact solutions for unbalanced designs, a simple approximation method for calculating the power of a design is also given.

Empower the Future: A Culture of Empowerment - The Link to Organisational Effectiveness

Jurgens Frerk¹, Charles Mbohwa¹ ¹University of Johannesburg, South Africa

In a world where today's technology is yesterday's news, organisations will need to empower their employees to be nimble and to become organisational change enablers in order to ensure the organisation has the ability to manage and adapt to the huge competitive pressures. These pressures are further exacerbated by the rapid evolution of technological advances and the rapid deconstruction of global boundaries. Continued process improvement projects, business process re-engineering and escalating cost reduction pressures are now the normal cognitive activities which occupy senior managers in their day-to-day routines.

Process Reliability Modeling Based on Characteristic **Mapping** Wei Dai¹, Fen Kuang¹, Jin An¹, Yu Zhao¹

¹Beihang University, China

Process reliability modeling is of great significance to guarantee the reliability of the manufacturing process. This paper will describe how to establish the relationship between reliability index of process resource and process parameters by studying the characteristic mapping of manufacturing process, which pays more attention to the process instead of product. Firstly, the key characteristics of process will be determined, whose levels can be designated appropriately according to the requirements of process reliability. Secondly, reliability modeling method will be employed to catch the significant factors affected the process reliability, and the relationship between process elements, processing parameters, product reliability and product functions were analyzed based on Analytic Network Process. Finally, the algorithm and procedure is discussed for manufacturing process reliability modeling, and interrelated process parameters are selected to improve reliability of the product.

A Case Based Approach for Modeling Process Elements and Overall Service Quality Perception

Sheila Roy¹, Indrajit Mukherjee¹

¹IIT Bombay, India

Analyzing service quality (SQ) is a key area of interest for many researchers and practitioners. Translating the abstract nature of SQ construct into insights about critical process variables that impact the desired quality level is a challenge for any service industry. The objective of this research is to illustrate an approach to mathematically model the relationship between customer perception of process elements and overall SQ perception. A case study in an organizational context along with a customer survey is conducted to test the suitability of the regression-based mathematical modeling approach. Three critical process elements in this organization setting are identified which impact the perception of overall SQ.

An Integrated Architecture for Lean Waste Analysis

Mohamed K. Omar¹, Rohana Abdullah², Md Nizam Abd Rahman² ¹Nottingham University Business School, Malaysia ²Universiti Teknikal Malaysia Melaka, Malaysia

Lean has become very popular for companies striving towards reducing wastes and improving their efficiency. The fundamental work in Lean implementation includes establishing the standard times for the process under study before the information can be used to determine the resource capacity. The traditional work study methods such as Process Mapping and Man-Machine Charts are no longer suitable to be used in the complicated manufacturing environment such as in the electronics. This paper reports on an integrated architecture for conducting work study and performing lean waste analysis. The developed architecture was implemented at an electronic manufacturing company. The benefits observed from the implementation phase indicate that the proposed architecture has reduced the lengthy time that work-study usually takes, eliminated human error during analysis and improved the accuracy of data.

Session Information Processing and Engineering (1)

Date Wed, 12 Dec Time 13:30 - 15:00 S224 Room

Chairs Jose Machado, Hendry Raharjo

Improvement of Retrieval in Case-based Reasoning for System Design

Thierry Coudert¹, Elise Vareilles¹, Laurent Geneste², Michel Aldanondo¹

¹University of Toulouse, France

²LGP/ENIT - Université de Toulouse, France

The problematic addressed in this article is dealing with the improvement of retrieval in Case-Based Reasoning for system design. The retrieval activity is based on the evaluation of similarities between requirements (target) and the solutions (sources). However, similarities between features is often a subjective kind of knowledge difficult to formalize within companies. Based on an ontology of domain, the approach permits to retrieve compatible solutions rather than similar ones using a model of designer preferences. The requirements are modeled by means of constraints. When constraints are confronted to solutions in order to evaluate a compatibility measure, missing information within solutions with regard to requirements are taken into account using semantic similarities between concepts. A case study validates the proposals.

Construction of Transport Networks that Combine Building Pathways and Roads for Evacuation Routing and Scheduling Problem

Mojahid Saeed Osman¹, Bala Ram²

¹King Fahd University of Pertoleum and Minerals, Saudi Arabia

²North Carolina A&T State University, United States

The availability of route network data is one of the key elements of evacuation route modeling for solving capacity-constrained routing problem; the data must include real-time updates, and routing must be in real-time. We consider the problem of constructing transport network data used for finding routes and schedules for evacuation from urban buildings and out of a predetermined neighborhood. The transport networks involve corridors and stairs in the buildings and road networks outside; there are a pre-defined set of exit points out of the road network serving the buildings. This paper offers a promising direction for constructing combined networks of buildings and roads using data extracted from GIS databases in conjunction with paths inside buildings, it discusses the process of developing collection of datasets for combined path networks for buildings and roads. Simple pedestrian flow capacity formulas for corridors and roads based on readily available geometric data are developed.

A Case Study on Real-Time Parcel Delivery Sequence Optimization

Jaekyung Yang¹, Wooyeon Yu², Myoung Jin Choi³ Chonbuk National University, South Korea

²Myongji University, South Korea ³Howon University, South Korea

Korea Post currently considers adopting a smart robot manipulation system to automate the parcel sequence sorting work which is still manually conducted at regional post offices in Korea. Regarding this system, this paper focuses on the optimization system designed to sort the parcel sequence and allocate sorting boxes. This optimization system can obtain the information of accepted parcels as well as information from the 3D image recognition system and uses meta-heuristic algorithms to enable robots to provide the parcel delivery sequence with a daily delivery volume to an individual postman. Also, this parcel delivery sequence is created based on the results of parcel sorting box allocation heuristics, allowing postmen to consider the delivery sequence of parcels when loading them onto their delivery vehicles. This paper outlines the overall sequence sorting, smart robot manipulation system, an interface with the optimization system, and operation process.

Comparing Complex Business Process Models

Philip Weber¹, Paul Taylor², Basim Majeed³, Behzad Bordbar¹

¹University of Birmingham, United Kingdom

²BT Innovate & Design, United Kingdom

³Khalifa University of Science, Technology and Research, United Arab Emirates Business process models extracted from real event data via process mining are often visually complex and hard to interpret, cannot easily display all of the relevant process data in one view, and are of unknown quality. It is therefore difficult to present a meaningful comparison of two mined process models, for example to confirm business changes have had a significant effect. We propose a framework for comparing process models, which integrates metrics, graph partitioning, notions of statistical significance, and visualisation techniques. This framework enables well-founded and intuitive methods for understanding and exploring differences between processes.

Critical Business Objects and Its Applications in **Designing Performance Management Systems**

Mohamad Aghdasi¹, Ehsan Malihi¹, Yasaman Asadi¹, Shohreh Ghadami¹ ¹Tarbiat Modares University, Iran

In this paper, the concept of Critical Business Object is used to define and select a criterion for measuring the organizational performance. Critical Business Object is a set of information objects in the organization, which affects the desired behaviors and the expected business process. To develop the Critical Business Object, first, we identify important organizational decisions and problems in different levels by considering the related literature. Then, we develop a model based on the concept. The model indicates Business process behavior aligned with business process objectives by identification and effective control of Critical Business Object. Loan Business Processes in Maskan Bank is selected as a case for running the example. In this study, 17 business objects are investigated and 4 critical business objects are identified by using rough set theory. Besides its simplicity, this approach can be used to design and manage the dynamic performance of the indicators.

Lossless Image Compression with Areas of Cross-Point Regions for Modeling

Tin Thanh Dang¹, Canh Xuan Huynh¹

¹Hochiminh City University of Technology, Viet Nam

This paper presents the scheme of ACRIC (Areas of Cross-point Regions for modeling in the scheme of Image Compression), a scheme for losslessly encoding and decoding images, especially medical images. Developed from the theory of cross-point regions for lossless images compression, ACRIC gives the new theory of cross-point regions to build areas of cross-point regions with using flexible lengths of ideal cross-point regions in entire crosspoint regions. Based on the effect of Gray coding on cross points which have grey values around 2n, the data bits of cross points trend to same states in cross-point regions after Gray coding, so we can optimize the probability of bits in certain areas of cross-point regions for the step of coding in the process of entropy coding. This leads to improving the compression ratio for the scheme ACRIC over the other schemes. The scheme of ACRIC is good for losslessly compressing medical images because of large areas of pixels of approximate grey values.

Session Information Processing and Engineering (2)

Date Wed, 12 Dec Time 15:30 - 17:30 S224 Room

Chairs Tin Thanh Dang, Thierry Coudert

Usability of an Electronic Health Record

Rui Pereira¹, Julio Duarte¹, Maria Salazar², Manuel Santos¹, Antonio Abelha1, Jose Machado1

¹University of Minho, Portugal

²Centro Hospitalar do Porto, Portugal

The Electronic Health Records (EHR) is a longitudinal electronic record of patient heath information generated by one or more encounters in any care delivery setting. The information included in the type of records can be progress notes, problems, medication, vital signs, medical history, laboratory data, radiology reports and much more. The usability of an EHR is crucial to achieve success, as well as guaranteeing a high level of safe and effective level of patient care system. Therefore, it is important for care providers to take steps to ensure that their EHR will be usable. Aiming to assess the usability of the EHR, a usability evaluation was performed. This paper describes how two usability evaluation methods (heuristic walkthrough and surveys) were used to evaluate its usability. With those evaluations, it was able to recognize the level of usability present in the EHR, along with the usability issues that can be disposed.

A Hybrid Evolutionary-based Process Mining Technology to Discover Parallelism Structures

Hsin-Jung Cheng¹, Yeh-Chun Juan², C. Ou-Yang¹

¹National Taiwan University of Science and Technology, Taiwan

²Ming Chi University of Technology, Taiwan

Information systems have been widely used to support workflow processes to record the execution of tasks in the process and are stored in so-called "event logs". Techniques that relate to events extraction have gotten increasing attention such as process mining techniques. Developed process mining methods such as alpha algorithm, alpha++ algorithm, and genetic process mining (GPM) are capable of tackling several structures well, but they are still difficult to discover parallelism structures efficiently since the parallelism are too complex. This work presents an evolutionary-based process mining approach based on a hybrid of GPM and particle swarm optimization algorithm (PSO) in order to handle parallelism structures. The medical records of acute stroke patients of Taiwanese medical institution are used as a practical case to test the proposed approach. Experimental results on the case show

Logistics Process Modeling and Execution in the Cloud

the effectiveness of the proposed approach for tackling parallelism

structures.

Jens Leveling¹, Damian Daniluk¹, Arkadius Schier¹
¹Fraunhofer Institute for Material Flow and Logistics IML, Germany

The main purpose of this study is to support the generation of a new service concept in B2B environment during the early stages of project development for capital investment. This concept will aim at creating additional value for the clients and satisfying their requirements better. The focus is on the first three phases of plant life-cycle engineering in the mining and metallurgical industries. During the research the interdependencies of the identified explicit and tacit customer wishes and the technical characteristics of services were reviewed and the related operational processes were proposed. The theoretical part describes the importance of industrial services in the business context as well as the aspects of their quality and value creation. The methodology of this study is based on the formalized method - Quality Function Deployment - that is selected as a most suitable tool for concept development. The empirical part includes an in-depth single case study, which follows the SQFD (Service QFD)

Application of Exploratory Data Analysis in Healthcare: the Case of Warfarin Initiation Phase in a Swedish Hospital

Hendry Raharjo¹, Baris Tekin¹, Jingren Chang¹ ¹Chalmers University of Technology, Sweden

Warfarin is an oral anticoagulant used to reduce the risk of thrombosis for patients with several clinical disorders including atrial fibrillation, leg thrombosis, and pulmonary embolism. Overdoses may cause serious bleedings, whereas too low doses may lead to stroke. The fact that every individual has a unique response to the drug makes the therapy process very challenging. Contrary to the use of genetic testing which is quite costly, this paper proposes the use of a data-driven methodology to uncover some factors, which

may affect patients' response to warfarin, that are possibly hidden in the patients' database. In addition to literature review in the related medical field, the exploratory data analysis and Bayesian network structure learning are used to help discover those factors and their interrelationships. The focus of this paper is placed on the initiation phase of the therapy, that is, when a new patient starts using

Exploring How Add-On Software Development Affects Graphic Editors' Learning Results

Liang-Yuan Hsiung¹, Mu-Hui Lai², Hwa-Ming Nieh³, Yuan-Du Hsiao⁴

¹Kun Shan University, Taiwan ²Hwa Hsia Institute of Technology, Taiwan

³Ming Hsin University of Science and Technology, Taiwan

⁴Chungyu Institute of Technology, Taiwan

To provide learners of graphics editing software with a self-initiated editing/learning method, this study's author developed, on the basis of Java programs, a piece of add-on software for self-extracted images. The software's functioning mechanism allows learners to keep track of the editing process with the retouched image displayed all at once, so they may gain the capability for self-initiated learning. The researchers kept a comprehensive record of image files generated in each step of the editing process, so the edited images can be compared against the original one. Based on such comparisons, users may scrutinize details in their graphics editing process that are improper or need improvements. The learning outcomes and satisfaction engendered by this innovative software were tested through a comparison between the experimental and control groups. In general, this software is fit for the education and training of image process courses on Adobe Photoshop.

Extendible Data Model for Real-time Business Process Analysis

Marcello Leida¹, Andrej Chu¹, Maurizio Colombo¹, Basim Majeed¹ ¹Khalifa University of Science, Technology and Research, United Arab Emirates This paper presents a promising data representation model for real time monitoring of business processes. The main benefit of this representation is that is transparent to the data creation and analysis processes and it is extendible at realtime. The model is based on a shared vocabulary defined using RDF standard representation allowing independence between applications. This model is a novel approach to real-time process data representation and paves the road to a complete new breed of applications for business process

Research on Real-time Temperature Monitoring System of Thermal Power

Jiang Guo¹, Ming-shu Fan¹, Kai-kai Gu¹, Xiao-Lu Xu¹, Ke-fei Zhang¹ ¹Wuhan University, China

The thermal power system become more complex as it develops to the direction of large-scale. This brings high efficiency as well as brings much hidden risk. Once the failure appears, less leads to the decrease of operating load, more leads to catastrophic shutdown, and even damage the unit equipment. Therefore, the research on the real-time temperature on-line monitoring system for thermal power units (RTOMSTPU) is of vital significance. RTOMSTPU, which is put forward in this paper, bases on the role-based access control (RBAC) model to control different users of business function operation and data information visiting, realizes the aim of the intelligent control for information flow. RTOMSTPU acquires real-time data, and after a serial of comprehensive treatment, generally, accurately and in real time, provides production managers with correct decisions.

Developing Kernel Intuitionistic Fuzzy C-Means Clustering for E-Learning Customer Analysis

Kuo-Ping Lin¹, Ching-Lin Lin¹, Kuo-Chen Hung², Yu-Ming Lu¹, Ping-Feng

¹Lunghwa University of Science and Technology, Taiwan

²National Defense University, Taiwan

³National Chi Nan University, Taiwan

This study develops the kernel intuitionistic fuzzy c-means clustering (KIFCM), and applies KIFCM in E-learning customer analysis. KIFCM combines intuitionistic fuzzy sets (IFSs) with kernel fuzzy c-means clustering (KFCM). The KIFCM has advantages of IFSs and KFCM which can effectively handle uncertain data and simultaneously map data to kernel space. The proposed KFCM has better performance than k-mean (KM) and fuzzy c-means (FCM) in numerical example. Furthermore, the study adopts the advanced clustering technology in Elearning customer clustering analysis, and analyses customer data based on clustering results by correlation analysis. The customer analysis result can provide for sales department, and assist to obtain customer's learning tendency in Elearning platform.

Session Production Planning & Control (4)

 Date
 Wed, 12 Dec

 Time
 11:00 - 12:30

 Room
 S225

Chairs Rashed Sahraeian, Ali Siadat

Economic Production Quantity Model with Imperfect Quality During a Process Adjustment Period

Ismail Al-Me'raj¹, Shokri Z. Selim¹, Yahya Cinar¹

¹King Fahd University of Petroleum and Minerals, Saudi Arabia

We consider a manufacturing process that generates non-conforming items until proper adjustment of the process is reached. Items produced after machine adjustment are assume perfect. The demand rate is assumed constant. The process stops when the production of conforming items is sufficient to cover the demand, then the cycle is repeated perpetually. Mathematical models for deterministic and random machine adjusting period are proposed. We find the optimal production quantity that results in minimum expected total cost. Two examples are presented. We also show that the optimal production size increases as the adjustment period increases, then at some value, it becomes constant.

A Review of Key Research Streams for Managing Uncertainties in Production Planning and Control

Emrah Arica¹, Jan Ola Strandhagen¹, Hans Henrik Hvolby²
¹Norwegian University of Science and Technology, Norway
²Aalborg University, Denmark

This paper explores how the production planning and control problem is carried out under uncertainty by the two main research streams: (i) internal planning (ii) advanced production scheduling and rescheduling. Having analyzed some of the common and contradictory results of these research streams, this study proposes a framework for a comprehensive/holistic management of uncertainties in production planning and control. The theoretical contributions can be considered twofold: (i) analyzing and comparing the approaches of these two traditionally separate streams (ii) synthesizing and combining their findings to develop a theoretical framework and to propose future research directions for how to manage uncertainties in real world manufacturing systems. The practical contribution is nested with the theoretical ones as the study contributes to narrow the research-practice gap. The main limitation of this study appears due to the lack of empirical data and analysis.

A Novel Process Planning Approach for Hybrid Manufacturing Consisting of Additive, Subtractive and Inspection Processes

Zicheng Zhu¹, Vimal Dhokia¹, Stephen Newman¹

¹University of Bath, United Kingdom

In recent years, hybrid manufacturing technologies that combine different processes have gained significant attention. This is due to their ability to capitalise on the advantages of each individual process, whilst minimising their disadvantages. However, there are limited process planning methods that are able to effectively utilise manufacturing resources for hybrid processes. In this paper, a hybrid process entitled iAtractive, combining additive, subtractive and inspection processes, along with part specific process planning is proposed, aiming to provide the designer with greater manufacturing capability and flexibility. This novel process planning approach enables a plastic part to be manufactured with enhanced process capabilities, reduced production time and material consumption. This approach can be also adopted to remanufacture and reincarnate exiting parts or legacy products into other products. In this paper, the principle and framework of this process planning approach is presented and a test part was manufactured to validate this innovative approach.

A Real Time Event Supervisor System for Efficient Production Control

Emrah Arica¹, Sindre Grindheim¹, Olivier Roulet-Dubonnet¹

¹Norwegian University of Science and Technology, Norway

The production planning and control (PPC) task has long been a challenge in the presence of disturbances in a manufacturing system. This paper proposes a conceptual description of a system termed as "real time event supervisor" to facilitate the decision making process for production control. The three key components of the system are: data processing, real time distributed communication system, and knowledge service. This study contributes to narrow the research-practice gap in production control as the developed system considers the applicability and practicality issues in a real life manufacturing context.

The Problem of One-Dimensionally Cutting Bars with Alternative Cutting Lenghts in the Tubes Rolling Process

Richard Lackes¹, Markus Siepermann¹, Torsten Noll²

¹Technische Universitat Dortmund, Germany

²V & M Deutschland Gmbh, Germany

The input material of the tubes production process consists of steel bars that have to be cut into pieces before they are heated and rolled. In order to avoid waste of input material the cuts of the input material have to be optimised which is a classic one-dimensional cutting problem. A special characteristic of the tubes production is that the same output can be reached with different cutting lengths. Thus, the minimisation of input material gets more difficult and the known algorithms have to be adapted.

Assembly Process Driven Product Architecting

Harrys Daniilidis¹, Udo Lindemann¹

¹Technische Universitat Munchen, Germany

The assembly process constitutes an important influencing parameter of product development. Therefore, a product architecture has to be designed taking constraints and requirements deriving from the manufacturing and the assembly process into consideration. This paper introduces a systematic approach to optimize product architecture from the assembly process point of view by enhancing modular design.

Session Systems Modeling and Simulation (1)

Date Wed, 12 Dec Time 13:30 - 15:00 S225 Room

Chairs Szu Hui Ng, Pei-Fang Tsai

Estimating Machine Startup Timing with Petri Nets

Reggie Davidrajuh¹

¹University of Stavanger, Norway

Machine startup timing is a crucial performance factor in large production facilities. Though Petri net is a well-proven methodology to solve problems in discrete event systems, Petri net is applied under the assumption that each operation starts when the preceding operations are completed; thus, the Petri net approach is assumed less effective and max-plus algebra (along with the dependency graph) is employed as the default tool for estimating startup timing. However, the max-plus algebra approach is iterative that takes O(n3) computations, where n is the number of machines. This paper proposes a procedure with which a dependency graph can be converted into a Petri net model and the startup timing can be estimated in linear O(n) computations.

Simulating Staffing Needs for Patient Registration in a Hospital

Sung Shim¹, Arun Kumar², Roger Jiao³
¹Seton Hall University, United States ²RMIT UNIVERSITY, Australia ³Georgia Institute of Technology, United States

As healthcare costs increase, there is a need for hospitals to look for ways to contain costs and to achieve a higher efficiency without sacrificing quality. Just as many businesses have successfully reduced costs and gained competitive advantage by reengineering business processes, hospitals are now beginning to adopt a process-oriented approach and redesign the way certain processes are carried out to achieve cost containment and efficiency. Using computer simulation, this study assessed the efficiency of the patient registration process in a hospital and recommended the optimal number of clerks for the process, at which clerks could be most efficiently utilized and patient wait times could be reduced. The results show that computer simulation is an effective tool supporting decisions on staffing needs for the patient registration process in hospitals.

Simulation Based MANOVA Analysis of Pharmaceutical Automation System in Central Fill Pharmacy

Debiao Li¹, San Wong Yoon¹

¹State University of New York at Binghamton, United States

This paper presents a factorial multivariate analysis of variance (MANOVA) based on the experimental results of a simulation model for a given central fill pharmacy (CFP). CFP is a highly integrated pharmaceutical automation system, which can process thousands of prescription each day. The simulation model was built to analyze this complex system. Then the MANOVA was conducted to identify key system configurations are the fill-time window and auto-collation timeout. The proposed three minutes fill time window and 45 minutes auto-collation timeout could increase 16.5% throughput in the CFP.

Enriching the Generic Simulation Modeling and Executing Framework with the Statistical Software Package R and the **SOLite Database**

Dae-Eun Lim', Jangwon Cho², Haejoong Kim², Hyun-Min Park³ ¹Baek Seok University, South Korea ²Samsung Electronics, South Korea

³Pai Chai University, South Korea

Simulation analysts have difficulties in handling and analyzing large volumes of simulation results such as log files of thousands of production and transfer equipment. Also, most of simulators do not have various or strong statistical analysis functions. In this paper, the statistical software package R and the SQLite database are introduced to the generic simulation model framework. Benefiting from the two software packages, conducting various statistical analyses and handling large volume of data have become easier.

Coil Baking Process Modeling with Neural Network

Wimalin S. Laosiritaworn ¹Chiang Mai University, Thailand

Coil baking process is one of the critical processes in a case study company which is a manufacturer of hard disk drive actuator in Thailand. At the moment, the company is dealing with quality issue arisen from the distortion of the baked coil. Parameters affect the baking process are for example baking temperature, baking time, air ventilation pressure and position in the oven. Neural network technique was used to model the relationship between the mentioned factors and the distortion of the coil. The trained network can be used to predict coil distortion before the production occurs. Therefore, helps to reduce the defect rate.

Integrated Optimization of Pricing, Production and Delivery Decisions in a SVMB System of Deteriorating Items and PSO Algorithm

Zhixiang Chen¹, Bhaba Sarker², Bingqing Wu²

¹Sun Yat-Sen University, China

²Louisiana State University, United States

This paper studies an integrated optimization model of pricing, production and delivery decisions in a single-vendor multi-buyer (SVMB) system comprising of a manufacturer and multiple distributors of deteriorating items. Since the model is a complex nonlinear programming problem, it is impossible to solve it using classic optimization methods. In this paper, Particle Swarm Optimization (PSO) is designed to solve the model. Experiment shows that the algorithm is effective for solving the model. This is first article for integrated pricing and inventory in SVMB environment with solution using PSO algorithm.

System Reliability Modeling for Multi-state Hierarchical System with Multi-level Information Aggregation

Mingyang Li1, Byoung Uk Kim2, Jian Liu1 ¹The University of Arizona, United States

²Ridgetop Group, United States

System reliability modeling is often constrained by the scarcity of system-level reliability information. Multi-state hierarchical system structure further imposes the modeling difficulty due to the complex failure relationship among the system and its composing subsystems and components. This paper proposes a Bayesian-based multi-level information aggregation approach for reliability modeling of the multi-state hierarchical system. All available reliability information throughout the system is utilized for better accuracy of the system reliability modeling. Numerical case study demonstrates the effectiveness of the proposed methodology.

Session Systems Modeling and Simulation (2)

Date Wed, 12 Dec Time 15:30 - 17:30 S225 Room

Reggie Davidrajuh, Zhixiang Chen Chairs

A Case Study of Using Simulation for Process Improvement in a Hospital Admission Center

Pei-Fang Tsai¹, Jian-Ciang Chen¹, Jhih-Han Chen¹, Fu-Man Lin², Porntipa Ongkunaruk³

¹National Taipei University of Technology, Taiwan

²Mackay Memorial Hospital, Taiwan

3Kasetsart University, Thailand

Hospital admission center has an intrinsic position in a general hospital which provides inpatient services. To improve the service quality, this research aims to conduct a trade-off analysis in reducing the patient total time and number of waiting patients in an admission center for an academic hospital in Taipei. A simulation model was built to identify the bottleneck during the rush hours and alternatives were evaluated for their potential benefits. It was found that the blood collection station caused the longest delay, about more than 7 minutes on average, in the registration process for patients who need pre-admission tests. As for the schedule of guidance assistants, the average waiting time for guidance service can be reduced by at least 49% for patients who needed the services if the time between rounds were shortened from 17 minutes to 12 minutes. These findings had been used to support changes in this center.

Applying the Informatinal Approach to Global Optimization to the Homoscedastic Stochastic Simulation

Jun Yuan¹, Chengwei Han¹, Szu Hui Ng¹ ¹National University of Singapore, Singapore

In many engineering applications, the meta model serves as a surrogate to the simulation model for global optimization. Previously, the kriging meta-model and the global optimization algorithm, Efficient Global Optimization, are well developed for both the deterministic and the stochastic simulation models with respective versions of the Expected Improvement (EI) criteria. Recently, another global optimization approach, Informational Approach to Global Optimization (IAGO), is introduced for optimizing the deterministic simulation models. This paper contributes to refining this approach to solve the stochastic simulation model optimization problem under the homoscedastic intrinsic uncertainty. Detailed formulation of the problem and a refined algorithm are presented in the paper. The comparison between the proposed stochastic IAGO criterion and the Augmented EI (AEI) criterion is conducted with examples. The results show that the proposed stochastic IAGO locates the global optimal point more accurately than the AEI criterion with fewer additional observations required.

SLA-Based Virtualized Resource Allocation for Multi-tier Web Application in Cloud Simulation Environment

Haitao Yuan¹, Jing Bi², Bo Hu Li³, Xudong Chai², Ming Tie⁴

¹Beihang University, China ²Beijing Simulation Center, China

³Beihang University, Beijing Simulation Center, China

⁴Beijing Institute of Near space Vehicle's Systems Engineering, China

Virtualized resource allocation for multi-tier web applications in cloud environment brings new challenges to cloud infrastructure providers. In order to meet the constraint of SLA and allocate the available virtualized resources optimally, this paper proposes a resource allocation algorithm for infrastructure providers who want to minimize infrastructure cost and SLA violations. Our proposed algorithm can maximize the overall profit of cloud infrastructure providers when SLA guarantees are satisfied or violated in a dynamic resource sharing cloud environment. The experimental evaluation with a EUCALYPTUS-based cloud and a realistic workload, and the comparison with the existing algorithm demonstrate the feasibility of the algorithm and allow a cost effective usage of resources in cloud simulation environment.

Simulation Study on the Effect of Diagnosis Related Group Design in Length-of-Stay and Čase-Mix Index for Hospitals in Taiwan

Jian-Ciang Chen¹, Pei-Fang Tsai¹, Fu-Man Lin²

¹National Taipei University of Technology, Taiwan

²Mackay Memorial Hospital, Taiwan

In this study, a simulation meta-modeling approach was used to explore the potential impact in full scale implementation of Taiwan's diagnosis related groups (tw-DRG) payment system on efficiency measures such as length of stay (LOS) and case-mix index (CMI). The aim of this research

was to identify the levels of variation in the design of DRG on the expected response from healthcare providers. Results showed that the greatest reduction in total LOS was achieved when the coefficient of variance (CV), or unitized risk, was within 0.8. Furthermore, the mean LOS would be decreased further if the hospitals took more cases with high-risks. This simulation study provided expectation in adopting higher CMI for better financial calculation and higher bed turnover when switching to tw-DRG payment system.

Synthetic Population - A Case Study of Hong Kong Population

Yam Hon Chan¹, Kwok Leung Tsui¹

¹City University of Hong Kong, Hong Kong

There is an increasing trend of applying agent-based large scale stochastic simulation in analyzing and improving performance of public health systems to reduce disease spread within a community. An accurate and representative synthetic population is a foundation to a quality simulation outcome. Using the Synthetic Reconstruction approach, an adaptable population generator that is capable to mimic community structures of a sizable city is developed. Major demographic properties are taken into account for the generator. A sample of around 7,000,000 artificial individuals is generated with the preliminary result presented. We proposed that the generic population generator can be used as an adaptive input component to simulation models of various researches that aims to mimic city dynamics. Such simulation tools can create a virtual model that tests for possible alternatives without actual implementation and help to develop quick decision analysis and support for policy makers.

Consideration of Human Reliability in Actor-Oriented Simulation of New Product Development

Soenke Duckwitz¹, Raymond Djaloeis¹, Malte Hinsch¹, Joerg Feldhusen¹, Christopher M. Schlick¹

¹RWTH Aachen University, Germany

New product development projects are characterized by inherent uncertainties of both the product and process as well as an extensive influence of human behavior on the course of the project. These characteristics are accounted for in a self-developed actor-oriented simulation model by taking the decision-making of the individuals into account under consideration of the underlying structure of the work process. This paper presents an enhancement of our actor-oriented simulation model, which is not only able to deal with task priority and urgency but can also simulate (bounded) human reliability. Furthermore, results of a large-scale empirical study to gather quantitative data on human error probabilities in new product development under laboratory conditions are presented and discussed.

Layout Redesign of a Warehouse through Modeling and Simulation

Chin Soon Chong¹, Feng Yu Wang², Laura Xiao Xia Xu¹, Eng Hock Lua¹ ¹Singapore Institute of Manufacturing Technology, Singapore ²Singapore Institute of Manufacturing Technology, Nanyang Technological

University, Singapore Warehousing consists of many discrete operations that occur randomly. To ensure a warehouse works efficiently, both the warehouse design and daily operations management need to consider dynamics and randomness. In this case, discrete-event simulation becomes an indispensable tool for warehouse performance improvement. In this paper, we will discuss on our work in developing a simulation model to evaluate and improve the performance for a warehouse of a fully integrated milling and electrical discharge machine manufacturing company. The manufacturing environment is an assembly-to-order type of production, driven by customer orders. The primary objective of the study is to evaluate the capacities of the warehouse for a ramp up of monthly production and, subsequently to redesign the warehouse to cater for the demand increase. We focused on warehouse layout and consider warehouse operations of parts receiving, storage, order picking and delivering the kits to the production shop floor.

Picking Path Optimization of Automated Storage and Retrieval System

Xiaocui Miao¹, Lindu Zhao¹ ¹Southeast University, China

The problem of picking path in warehouse is a specific Travelling Salesman Problem. Unit-load AS/RS are the basal type of AS/RS. This paper proposes an optimal strategy of picking path which is called first retrieval after storage (FRAS) in a unit-load AS/RS. Compared to the nearest-neighbor (NN) rule, FRAS strategy can reduce the travelling time of crane and make the storage racks fully utilized. This paper presents a simple and feasible algorithm, and then achieves the simulation analysis through MATLAB, which verifies the effectiveness and feasibility of the algorithm.

Session Service Innovation and Management (1)

Date Wed, 12 Dec Time 11:00 - 12:30 S226 Room

Chairs James K. C. Chen, Ville Ojanen

Modeling Population Dynamics on a Spatially Distributed Service Network: Depicting the Influence of Socio-economic Factors on Service Delivery

Joymariel Melecio-Vinales¹, Alexandra Medina-Borja¹, J Medin²

¹University of Puerto Rico at Mayaguez, Puerto Rico

²University of Puerto Rico at Bayamon, Puerto Rico

The operational environment of social service organizations is significantly affected by external elements such as population demographics (e.g. births, deaths or migration), community wealth, market size, etc. We are interested in demonstrating how the performance of a networked social service organization performance is affected by these external elements by simulating the direct impact of these factors have on the organization's revenue generation. A dynamic model that describes a non-profit organization with a network structure has been developed. By executing the model we explored whether the network can reach a state of maximum performance when all the external factors are changing over time. The results suggest that this desired state is achievable but the length of time required by the system to accomplish this state is questionable. This research contributes to service science by modelling a large service network organization using the system dynamics simulation paradigm seeking to optimize the network.

Microfoundations of Dynamic Capabilities: A Case Study in Airline Catering Industry

Emre Eksi¹, Ayberk Soyer¹, Sezi Cevik Onar¹

¹Istanbul Technical University, Turkey

Dynamic capabilities are vital for organizations to survive under changing environmental conditions. Dynamic capabilities enable organizations to utilize their assets and create competitive advantage. For an organization, making right changes at right time requires dynamic capabilities and underpinnings that facilitate these capabilities. These underpinnings are described under the notion of microfoundations in analyzing the existence of these capabilities. Microfoundations include both organizational abilities such as, routines, structures, processes, policies and individual abilities like entrepreneurship skills, knowledge and experience. In this research microfoundations of dynamic capabilities (sensing, seizing and reconfiguring) are examined in the empirical context of DO&CO A.G.

An Operational Definition of Path Dependency

Cigdem Kadaifci¹, Ayberk Soyer¹, Sezi Cevik Onar¹

¹Istanbul Technical University, Turkey

Path dependency thought emphasizes the impact of past decisions or actions on the strategic options for organizations and examines the possible organizational lock-ins caused by self-reinforcing mechanisms that increase the attractiveness of a path, relative to others. Path dependent behaviors limit the innovative improvements and prevent the creation of alternative paths which in turn will cause inflexibility. Although it is a widely studied concept, there is a lack in the literature that focus on modeling, operationalization, and measurement of path dependency. In order to adapt and respond flexibility to the ever changing business environment and attain competitive advantage, firms should find the ways of escaping from or breaking a path which is only possible through being aware and managing the antecedents and effects of path dependency. Therefore, in this study it is aimed to suggest a path dependency measurement model for revealing all these relations.

Developing a Measurement Model for Path Dependency

Burcu Akyildiz¹, Sezi Cevik Onar¹, Ayberk Soyer¹

¹Istanbul Ťechnical University, Turkey

Path dependency expresses how the set of decisions is bounded by the decisions that were made in the past, even though previous circumstances may no longer be valid. Path dependency is described in three phases: preformation phase (which is characterized as a broad scope of action, where choices cannot be predicted, but are influenced by prior events or initial conditions), formation phase (where an organizational path starts to evolve as the range of strategic options narrows), and lock-in phase (where a further constriction emerges that cause the organizations to lose their flexibility). In order to avoid the risks of path dependency, managers should be well aware of their firms' current phase, which makes the measurement of path dependency significantly important for the firms' survival. Although it's importance, in literature relatively few studies focused on the measurement of path dependency. Therefore, the aim of this study is to develop a model for measuring path dependency.

The Driving Forces of Customer Involvement in Service Innovation from the Customer

Jun Jin1, Junying Chen1 ¹Zhejiang University, China

Service innovation has been recognized as one kind of important innovation in companies in order to improve their competitive advantages. The customer involvement has attracted more and more attentions from academies and industries. However most of such research is analyzed from the perspective of service providers, focusing on how to incorporate more customer involvement into service innovation. Why customers are willing to participate in the service innovation of companies? It is still a question under investigation. This paper is going to answer this research question, what drive customers to involve in service innovation. The research analyzes the driving forces of customer involvement based on a survey on the Chinese telecommunication services in two cities. The research results suggest that customer satisfaction, customer knowledge and customer self-efficacy are key driving forces which significantly influence customer to involve themselves in the incremental service innovation in the Chinese telecommunication

Characterizing Product-Service Systems in the Healthcare Industry - An Internal Stakeholder Perspective

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This paper presents a preliminary productservice system (PSS) classification framework, which challenges the existing schemes that have not distinguished services from intangible products. Two recently completed cases in the health information and communications technology sector have revealed new dimensions for PSS classification from the perspective of internal stakeholders, that is those within the company who are directly involved in the new PSS development. These new dimensions are volume, value, and quality. Volume is the relative number of product / service elements in the PSS. Value is the relative product / service contribution to the worth of the PSS. Quality is the combination of features, knowledge, skills and attitudes that affect the successful usage of the PSS. The findings also suggest that a PSS configuration might remain constant when the product and service proportions change. The results from these two cases have provided important directions for further work in PSS classification

Session Service Innovation and Management (2)

 Date
 Wed, 12 Dec

 Time
 13:30 - 15:00

 Room
 S226

Chairs Zhaotong Lian, Alexandra Medina-Borja

Applying Quality Function Development to Develop the Home Delivery Service Model for Specialty Foods in Traditional Market

Mu-Chen Chen¹, Chia-Lin Hsu², Ying-Yi Lee³

¹National Chiao Tung University, Taiwan

²Chinese Culture University, Taiwan

³President Transnet Corp., Taiwan

Although a few studies have been done to investigate the issue of new service development (NSD) in an emerging market, it is deficiency in the development of home delivery service (HDS) for specialty foods in traditional market. Thus, this study takes a Taiwan's HD companies as a subject and uses quality function deployment (QFD) to develop the home delivery service model based on NSD model. In the area of voice of customer (VOC), the results reveal that e-shoppers put emphasis on the security of personal information and trading mechanism. As for HDS for specialty foods in traditional market, customers pay attention to the speed of delivery service, freshness of foods and quick responses from HD companies when any problems happen during delivery. Furthermore, in the area of voice of engineering (VOE), the main suggestions for improvement are training staff, setting up a brand, and strengthening system effectiveness and information safety.

Research on Service-oriented Manufacturing Based on Service Knowledge Integrated Platform

Gao Na1, Zhao Songzheng1

¹Northwestern Polytechnical University, China

It is a focal issue in the literature to explore the manufacturing transition. Many researchers pay attention to the studies on service-manufacturing concept and value mechanism, but not researched on service-manufacturing operation model. Therefore, this paper review the service-oriented manufacturing concepts, proposed service-manufacturing concepts; then analyzed the transformation of manufacturing and service development course, summarized the necessity of traditional manufacturing to service-manufacturing. Based on this, advanced service knowledge integrated model, and takes it as a platform to put forward a service-manufacturing mode. This mode reflects features of service-manufacturing. It has certain theoretical and practical significance on servicemanufacturing.

The Application of Value Innovation from Blue Ocean Strategy in Cultural Creative Industy

Tain-Fung Wu¹, Chih-Lan Kao¹

¹Asia University, Taiwan

This study not only provided a comprehendsive discussion involving the formation of Blue Ocean Strategy, the future prospect, and people managing Taiwan Music Cultural District, but also expanded to further include some other relevant issues. The application of Blue Ocean Strategy adopted by the study subject can provide some useful information for others in the cultural creative industry. Practically, due to a cultural nature of the study case, the study result can also offer a concrete method for managers in the art and culture Industries to tailor their own industry-specific Blue Ocean Strategy.

Pathway Identification via Process Mining for Patients with Multiple Conditions

Xiaojin Zhang¹, Songlin Chen¹

¹Nanyang Technological University, Singapore

Pathway identification is essential to support patient-centered clinical guideline design for patients with multiple conditions. This research proposes a method based on process mining to sift through a large number of patients' medical records in order to match patients' medical profiles with the healthcare services needed in the form of pathways. A heuristics miner algorithm is developed and tested with a case study involving patients with multiple conditions. It is found that process mining can be applied in the healthcare context to identify pathways with correct ordering of healthcare services and process constructs. The mined pathways provide a reference process model for designing healthcare services that are catered to individual patients' needs.

Service Recovery Matrix: Matching Service Failures and Recovery Options

Victor John Cantor¹, Richard Li¹

¹De La Salle University - Manila, Philippines

Service failures are inevitable in any service delivery process thus when a service failure occurs, a good service recovery is warranted. This study focused on establishing relationships among service recovery factors to identify a mix of recovery options that will assist in designing effective service recovery systems. Factors considered were the severity of failure, outcome and process recovery, complaining behavior, and relationship quality. Using a scenario-based survey approach and structural equation modeling, the results revealed the following: severity of failure has a significant negative relationship with satisfaction; outcome and process recovery are significant in attaining satisfaction regardless of the severity of failure; complaining behavior significantly moderates the relationship between the service recovery factors and satisfaction; and relationship quality was a stronger predictor of post purchase behavioral intentions than satisfaction. A service recovery matrix was developed to depict appropriate recovery options for different situations considering the desired level of satisfaction.

Utilizing QFD in Creation of a New Industrial Service Concept

Ville Ojanen¹, Tatiana Shunina², Tuomo Kassi¹Lappeenranta University of Technology, Finland ²Siemens, Russian Federation

The main purpose of this study is to support the generation of a new service concept in B2B environment during the early stages of project development for capital investment in order to create additional value for the clients and satisfy their requirements better. The focus is on the first three phases of plant life-cycle engineering in the mining and metallurgical industries. During the research the interdependencies of the identified explicit and tacit customer wishes and the technical characteristics of services were reviewed and the related operational processes were proposed. The theoretical part describes the importance of industrial services in the business context as well as the aspects of their quality and value creation. In this study, the formalized method – Quality Function Deployment – is selected as a most suitable tool for concept development. The empirical part includes an in-depth single case study, which follows the SQFD (Service QFD) logic.

Exploring Innovation Model for Business Technology Incubator in Developing Countries

James K. C. Chen¹, Chu-Shiu Li¹, Amrita Batchuluun¹

¹Asia University, Taiwan

There are a few qualitative studies for successful businesses—technology incubator (BTI). Developing countries still investigate a successful design for business technology incubator, but have not identified an appropriate one. This study examines the secondary data focusing on 10 developed and 20 developing countries. The data analysis bases on scenario method underlying an importance of the linkage between Government, BTI, university and SMEs. The finding indicates a significant importance of the innovation model to provide a solid support and a full contribution for BTIs in the technological world.

Session Service Innovation and Management (3)

 Date
 Wed, 12 Dec

 Time
 15:30 - 17:30

 Room
 S226

Chairs Willem Selen, Songlin Chen

The Impact of Culture, Leadership, Governance, and ICT Systems on Service Innovation in Service Value Networks

Renu Agarwal¹, Willem Selen²

¹University of Technology Sydney, Australia

²United Arab Emirates University, United Arab Emirates

This study investigates the impact of organisational leadership and governance, ICT infrastructure and organizational culture on innovation in services, using empirical data from a major Australian telecommunication service provider and its partnering organisations. empirical results show that governance, leadership. organisational culture, and ICT integration attributes all contribute significantly to the creation and delivery of innovation in services. Governance strategies tend to structure and regulate the conduct of the parties in an exchange, however when integrated, they constrain the latitude of decision making within the relationship. It is important that an environment of mutual support and culture is created to establish volitional compliance amongst partners. This is possible only through collaborative communication, openness and trust, with seamless integration of ICT systems, which allows transparent flow of information for real-time decision making.

The Relationships Between Beach Vacationers' Motivation and the Physical Settings of Beaches

Huey-Hsi Lo1

¹Aletheia University, Taiwan

This study focuses on Taiwan's need for coastal recreation in light of its participatory role in an interrelated world community; at the same time, it reflects Taiwan's emerging prosperity and the current inadequate utilization of expanded leisure time available to its citizens. Principle component factor analyses were used to group the 32 items that pertained to motivation from the Recreation Experience Preference (REP) scales into six major categories, and to group that 25 setting attributes into five major categories. The results indicated that the most strongly preferred recreation experience was a desire to experience nature. Specifically, the results showed that beach vacationers with higher educational levels had significantly higher motivation for going on beach vacationers than those with lower educational levels. Correlation between beach vacationers' motivations and the attributes of beach resort sites resulted in a positive and significant association.

Equilibrium Strategic Behavior and Optimal Pricing with Experience Service

Zhaotong Lian¹, Jinbiao Wu², Lihua Cao³¹University of Macau, China²Central South University, China³Shenzhen University, China

In many service settings, service provider may provide free experience service for customers in order to attract more consumers. However, providing free experience service results in longer waits for customers who queue for the standard service based on service value, delay costs and price. We model this service setting using a single server Markovian queueing system. We study equilibrium strategies for customers in two cases, according to the customers whether observe the status of the system. We derive the optimal price and experience service rate. We analyze the problem of social welfare optimization. Finally, we numerically analyze the impacts of the various parameters on the the customer equilibrium strategy, the optimal price and experience service rate.

Exploring CRM Implementation - The Conceptual Model of the Impact of CRM on Service Operations

Pimjai Tongmee¹, Prattana Punnakitikashem

¹Mahidol University, Thailand

This paper aims to explore the impact of customer relationship management (CRM) implementation on service operations management (SOM). The impacted components of SOM are identified. Moreover, the conceptual model of the impact of CRM on SOM is proposed. The model suggests that CRM implementation impacts SOM in three areas which are service process, service personnel and service package. In each area, impacted sub-components are also identified in order to facilitate the understanding to both academics and practitioners. For service process, CRM implementation results in muti-channel integration, service process automation and front- and back- office integration. In terms of service personnel, CRM impacts the change in customer orientation, measurement and reward system as well as level of empowerment. With regards to service package, the impact of CRM will be on customer knowledge, level of personalization and customization as well as product and service offering.

An Exploratory Study on Preferred Open Innovation Types and Partners in South African SMEs

Willie Krause¹, Corne Schutte¹, Niek Du Preez¹
¹University of Stellenbosch, South Africa

Open Innovation is fast emerging as an important innovation method. This paper explores the use of and preference towards Open Innovation within South African small and medium sized enterprises which also utilize social networking tools. It provides a view of which Open Innovation approaches are preferred together with which innovation partners are preferred based on eighty five survey responses. The survey was conducted under companies that have business networks on LinkedIn and shows that South African SMEs have an interest in open innovation and are currently using these methods, albeit mostly in an informal way. Collaboration is the approach mostly preferred by these SMEs, with customers and suppliers as the preferred innovation partners.

External Marketing and Internal Marketing: Which Capability Holds the Key to an Outstanding Performance?

Wen-Jung Chang¹, Christina Tay²
¹Delin Institute of Technology, Taiwan
²Chinese Culture University, Taiwan

Marketing is an organization's capability exhibiting superiority in communicating with customers, and creating high value-added products/services to differentiate from competitors and aims to make selling superfluous. Traditional marketing mixes (i.e., 4Ps) are known as external marketing capability (EMC) and has been the synonym for marketing capability (MAC) until the concept of internal marketing emerges. However, the EMC alone for a service organization cannot afford to manage complicated marketing problems except with the internal marketing capability (IMC) concurrently. Based on 261 valid samples from 70 Taiwanese universities, we uses structural equation modelling (SEM) to test research hypotheses and empirical findings indicate that MAC serves a complete mediator on market orientation (MO) and organizational performance (OP), while EMC advantages IMC to determine the performance of modern university.

Session Technology and Knowledge Management (4)

Date Wed, 12 Dec Time 11:00 - 12:30 S227 Room

Chairs Fu-Man Hsieh, Md. Mamun Habib

Do Individual Emotion and Corporative Environment Influence Technology Transfer in Taiwan Technology

Meng-Shan Tsai1, Meng-Chen Tsai2, Chi-Cheng Chang2

¹National Kaohsiung Normal University, Taiwan

²National Taiwan Normal University, Taiwan

This study aims to discuss the effects of individual emotion and corporative environment on technology transfer, and explores corporative environment moderating effects between emotion and technology transfer. Corporative environment includes interpersonal relationship and social relationship; technology transfer includes explorative organizational learning and knowledge sharing. To predict individual- and company-level simultaneously on technology transfer, hierarchical liner model (HLM) is performed. This study investigates 194 workers and 43 technology companies. The result shows emotion and social relationship were significantly related to technology transfer, and interpersonal relationship was positive moderating effect in the relation between emotion and technology transfer, but social relationship was not. The major limitations of this study included that workers in technology companies have heavy workload, so they do not have enough time to response the questionnaire, and obtaining questionnaires was not easy, so self-selection may be generated. The limitations hope to be solved in future studies.

Research on Knowledge Innovation Oriented Post-evaluation Method of Basic Research Project

Lin Gong¹, Zixu Chen¹, Guoxin Wang¹, Jiping Lu¹

¹Beijing Institute of Technology, China

Post-evaluation of basic research project is to evaluate projects in few years after the end of projects end. This kind of evolution is very important to judge whether project has knowledge innovation. Frist, this paper introduces the importance of post-evaluation method of basic research project and the life cycle of project management. Then, based on knowledge innovation, the index system which includes input and output is present. Evolution method selecting is analyzed and Data Envelopment Analysis (DEA) is introduced. After that, the process of knowledge innovation oriented post-evaluation of basic research project is built. Finally, an instance is evaluated and the result proves the feasibility and effectiveness of the method.

Analyzing the Building and Using Situations of E-learning Platform: From Total Quality Management and Knowledge **Management Perspectives**

Meng-Shan Tsai¹, Meng-Chen Tsai², Chi-Cheng Chang²

¹National Kaohsiung Normal University, Taiwan

²National Taiwan Normal University, Taiwan

This study aimed to discuss the building and using situations of e-learning platform, and treated total quality management and knowledge management as the theoretical foundations. The two teachers worked in the same college, and used this platform to teach students. This study was a qualitative research, both teachers had to answer 10 propositions, and the data collection method was semi-structured interview. The results included three parts: before using, using, and after using e-learning platform, which were analyzed by TQM, knowledge innovation, and knowledge sharing, respectively. The first part explained the process of building this platform; the second described that both teachers confronted difficulties, and the third depicted the approaches of the interactions between teacher and students. However, both teachers obtained different learning effects. The first teacher got the poor learning effects of the students, but the second got the well learning effects.

The Financial Impact of Using RFID in Healthcare

Ibrahim Al Kattan¹, Taha Anjamrooz¹

¹American University of Sharjah, United Arab Emirates

This paper is emphases on the financial impact of RFID system on the healthcare. The main obstacle of RFID implementation is the high costs hence the area of application must be very selective. We decide on the Obstetrics and Gynecology Department (OGD), where the patient has many visits during three different periods: Pregnancy, Delivery and after Childbirth. This research conducted over two

years to collect real data for two different scenarios, traditional versus RFID systems. The reductions in waiting times for each period are valued into money. The RFID technology can significantly improve the processing times associated with medical record retrieval, dispensing medication, personnel management and billing. This analysis is planned for a period of 5 years with discount rate of 4%. Finally, the net present value concept is applied in order to compare the financial benefit of two systems and to obtain the payback period.

Technology Evaluation: Fitting Tools and Techniques to the Stages of the Evaluation Process

Fernando Romero¹, Fernando Barbosa¹

¹University of Minho, Portugal

In this work we propose to look at the process of evaluation and selection of technologies. Building on evaluation models that assume stages and decision moments, we propose a complement to those models by suggesting specific methodologies, tools and criteria that seem to be appropriate for each specific stage. The research was based on a structured inquiry on the evaluation practices of thirty three firms from different sectors. One of the main results was the realization that the criteria, tools and methodologies that are adopted by firms are not uniform throughout the process of evaluation and adoption of the technologies. It depends on the stage of the process. Accordingly, we propose a division of the process in specified stages and we identify which criteria, tools and methodologies firms' values most at each one.

Knowledge Management Maturity Assessment in Research Institutions Using Analytic Hierarchy Process and Fuzzy Comprehensive Evaluation Method

Jingwen Li¹, Yaoguang Hu¹, Jialin Han¹

¹Beijing Institute of Technology, China

Knowledge management maturity assessment occupies an important place in knowledge management activities of knowledge-intensive organizations. Nowadays, obstacles to develop knowledge management still exist in many research institutes. According to this problem, we proposed a knowledge management maturity assessment frame using analytic hierarchy process and fuzzy comprehensive evaluation method to deal with the collection data. First, a two-dimensional knowledge management maturity model and a related index system were established; second, a combined method between analytic hierarchy process and comprehensive evaluation was used to analyze data; third, we designed a knowledge management capability improvement matrix to find out the shortcomings in different levels of knowledge management. A large research institute focused on aerospace industry in China was taken as the case institute to validate the frame in this paper.

Quality Dimensions Relevant to a First Tier Automotive Supplier: Case Study at an Automotive Seat Cover Supplier

Kem Ramdass¹

¹University of Johannesburg, South Africa

The most fundamental definition of a quality product is one that meets the expectations of the customer. În order to use quality as a strategic advantage, quality dimensions relevant within the specific industry needs to be specified. The company at which this case study was conducted faced various problems with regards to product quality and customer satisfaction. The objective of this research was to determine the relevant quality dimensions within the automotive seat cover industry and to evaluate these quality dimensions during a case study at a local seat cover supplier. The question that was raised was: "What are the factors or quality dimensions that must be considered when addressing issues related to product quality and customer satisfaction on an automotive seat cover production line?".

Session Technology and Knowledge Management (5)

Date Wed, 12 Dec Time 13:30 - 15:00 Room S227

Chairs Sha'ri Mohd Yusof, Antonio Verdu

Government as the Decision Maker in Infrastructure **Projects: What Diffusion Models Tell Us**

Ann Klobucher¹, Dan Edgar¹, Jessica Hildahl¹, Melissa Elfering¹, Harm-Jan Steenhuis1

¹Eastern Washington University, United States

This study examines the diffusion models for insights into how governments make decisions on which type of infrastructure projects to undertake. The existing technology diffusion literature was reviewed and based on this a conceptual model was formulated. The study will focus on High Speed Rail (HSR) infrastructure technology. Four countries with the most kilometers of HSR, i.e. China, Japan, Spain, and France, are compared to countries with limited or no HSR service, i.e. currently the United States, India, Morocco and Saudi Arabia. It was concluded that the current models for technology diffusion do not offer a complete model for government decision making. No particular factor was found that explains diffusion of

Knowledge Engineering in Interdisciplinary Research

Claudia Jooss¹, Rena Vossen¹, Ingo Leisten¹, Anja Richert¹, Sabina Jeschke¹ ¹RWTH Aachen University, Germany

This paper proposes an innovative knowledge engineering approach for interdisciplinary research clusters. In science, different competences, knowledge, scientific experience and cultures converge. To cope with this challenge it is necessary to combine several dimensions of human, organization and technology within a holistic knowledge engineering approach. Cooperation structures have to be adapted accordingly. The authors present prototypes of an application oriented research to promote interdisciplinary knowledge production.

The Complementary of TQM on Technology Management Strategy: A Multinational Perspective from the ASEAN Automotive Industry

Pei-Lee Teh1, Tritos Laosirihongthong2, Dotun Adebanjo3

¹Monash University, Malaysia

²Thammasat University, Thailand

³University of Liverpool, United Kingdom

This paper examines the complementary of total quality management (TQM) practices on technology management strategy and its impact on quality and innovation performance. Survey questionnaires were administered to automotive parts/components manufacturers in five Associations of Southeast Asian Nations (ASEAN) countries including Thailand, Malaysia, Philippines, Indonesia and Vietnam. The proposed conceptual model was empirically tested using 115 data at plant level. The results of structural equation modeling (SEM) analysis indicate that customer focus had a positive effect on technology management strategy leading to enhance product quality, product innovation and process innovation respectively. Our findings suggest that the operational excellence facilitators especially in the automotive industry should recognize and develop the major role of customer focus to improve their technology management and innovation. This paper also concludes by drawing new avenues for future research.

Does Science and Technology Correlation with Academic Ability? a New Science and Technology Linkage Evaluation Ranking System Introduce Yi-Ching Liaw¹, Chin-Yuan Fan², Te-Yi Chan², K. L. Chi²

¹Ming Chi University of Technology, Taiwan ²National Applied Research Laboratories, Taiwan

Organization rankings have long been a research issue. For those engaged in organization rankings, the most important goal is believed to identify suitable methods to assess the performance of research institutions objectively and effectively. Ratings based on academic research results have increased our understanding and recognition of organization rankings; however, current ratings have done little to reflect academic presentations and to connect with industrial applications. Therefore, we cannot identify the impact of academic papers on industrial practices by means of ratings. To this end, this research paper attempts to use the citation frequency of non-patented literature in patents database as rating criteria. The expected contribution will be an important basis for the relevant authorities to allocate resources, and can provide researchers with a more comprehensive reference while conducting relevant research.

Critical Knowledge Sharing Barriers: An Interpretive Structural Modeling Approach

Bhupendra Prakash Sharma¹, M. D. Singh¹

¹Motilal Nehru National Institute of Technology, India

In the present business environment, Knowledge Sharing (KS) has been identified as basic facilitator for the effective Knowledge Management (KM). This study investigates possible causes of resistance to the sharing of knowledge by knowledge workers at an individual, organizational and technological level within the organization. Theses causes are known as Knowledge Sharing Barriers (KSB). The objective of this paper is to identify the critical KSBs and their mutual influences. The interpretive structural modeling (ISM) methodology has been used to evolve mutual relationship among KSBs. It is observed that two KSBs, namely "lack of top management commitment" and "KM is not well understood", have high driving power and therefore deserve serious attention. Arrangement of KSBs in a hierarchy and their categorization into driver and dependent categories is an exclusive effort in the area of KM. The study concludes with discussion and managerial implications.

A Comprehensive Instrument to Efficiently Measure Firm IT Capability in an IT Environment

Chui Young Yoon¹, Seung Yong Kim¹

¹Korea National University of Transportation, South Korea

Nowadays, firms perform the management activities in an IT environment. In this environment, it is very important that a firm efficiently apply IT to its management activities and to improving the performance of tasks. We need the measurement and management for a firm's IT capability. Suitable measures are necessary for a firm to gauge its IT capability, for it to manage and improve its IT capability. The measures were extracted by the validity and reliability analysis from the first generated measures. The validity and reliability of the 15-item scale was verified. The developed instrument can efficiently measure a firm IT capability in a comprehensive perspective.

Session Facilities Planning and Management

Date Wed, 12 Dec Time 15:30 - 17:30 S227 Room

Chairs Armand Baboli

Process Management within a Multi-project Large-scale **Plant Engineering Environment**

Egon Mueller¹, Ralph Riedel¹, Martin Domagk¹, Christian Barnstedt², Florian Meurs²

¹Chemnitz University of Technology, Germany ²MAN Diesel & Turbo SE, Germany

Enterprises in the industrial sector of large-scale plant engineering are currently experiencing an extremely high level of competitive pressure. In order to stay profitable in the long run different approaches are suggested. The approach to increase the efficiency of a company during the project execution of turnkey plants, which is pursued in the present paper, refers to the establishment of process management. Competently conducted process management can build the foundation that enables companies to recognize existing potentials and make them implementable. Therefore principles of process management will be derived and applied in practice considering the specifics within large-scale plant engineering and the general level of knowledge regarding project management of complex multiple turnkey plant projects.

A New Multi-objective Mathematical Model for Relief **Logistic Network under Uncertainty** Mohammad Rezaei-Malek¹, Reza Tavakkoli-Moghaddam¹

¹University of Tehran, Iran

The strategy of pooling lead time risks by splitting replenishment orders among multiple suppliers simultaneously is an attractive sourcing policy especially in unreliable supply environments. Whereas various assumptions are considered in order splitting models developed, researchers tend to overlook an important inventory category in order splitting models, called deteriorating items. In this paper we develop an order splitting model for a retailer which offers a deteriorating product under stochastic lead time. For modeling the deterioration process, a non-linear holding cost function is considered. The inventory system is modeled as a continuous review system (s, Q). We then solve an example taken from the literature to show the effectiveness and applicability of the proposed model. Finally, by doing some sensitivity analyses for the key parameters of the model, single and split sourcing policies are compared under different conditions and some managerial insights are proposed.

Bibliometric Analysis of Power Grid Research: Identifying Knowledge Domain

Ichiro Sakata¹, Hisato Tashiro¹

¹The University of Tokyo, Japan

The concept of Power Grid is significant for innovation and economic development. However, since the term "power grid" represents a broad sense, there does not exist common understanding about what does the study of power grid consist of. We apply a methodology to determine the structure and geographical distribution of knowledge, as well as to reveal the structure of research collaboration in such an interdisciplinary area as power grid by performing journal information analysis, citation network analysis and visualization. Knowledge in these areas has been growing rapidly in recent years. Research competency of each field show some characteristics by subject and well distributed among USA, EU, and Asia. With structure analysis non-technical policy makers understand the fields of study and focus resources to necessary technologies.

Exploring the Antecedent and Subsequence Factors for Knowledge Management

Meng-Chen Tsai¹, Chi-Cheng Chang¹

¹National Taiwan Normal University, Taiwan

This study used document analysis to analyze the 1,064 studies about the knowledge management (KM) in the Science Direct On Line (SDOL) database. This study aimed to collect and analysis the paper about the KM in order to generalize which variables can impact KM and can be influenced by the KM. This study obtained the variables which affect KM, and these variables included information technology, decision support, and organizational culture. Besides, the variables could be influenced by KM, which included performance,

innovation, and enterprise competitive advantage. The other purpose was to count each variable was related to KM from the previous studies. The results showed that the most amounts of the studies present "decision support" influenced KM, and "performance" was influenced by KM in the database.

A Location - Routing Problem with Emergency Referral Solved by Using a Genetic Algorithm

Phongchai Jittamai¹, Jarupong Banthao¹ ¹Suranaree University of Technology, Thailand

In this research, a variant of the Location - Routing Problem (LRP), defined as the LRP with Emergency Referral (LRPER), is considered. The LRPER aims to solve the number of local blood banks (LBB) and their locations, assign hospitals to each LBB, as well as determine vehicle routes from LBBs to hospitals with emergency referral. The mathematical model for LRPER is proposed in this study. The problem seeks to minimize the total cost by simultaneously locating each LBB and determining the vehicle routes that satisfy emergency referrals. The LRP is known as a NP-hard problem, hence, the LRPER is also NP-hard. The methodology based on Genetic Algorithm (GA) is developed in this study. A data set composed of 36 hospitals is used. The algorithm is able to solve for locations and routes simultaneously and yields a decent initial solution. Solutions improvement is done by genetic operations.

A Single Phase Optimization of Stochastic Location Allocation Problem in a Two Echelon Supply Chain

Mahdi Bashiri¹, Mehdi Jafarian²

¹Shahed University, Iran

²University of Shahed, Iran

This study addresses a problem of location allocation in two echelon supply chain networks consist of manufacturing sites and distribution centers. Distribution centers locations are given while the factories should be constructed in determined sites. There are three simultaneous decision making stages in this problem, the first one focuses on the location decision and the second one is allocating the distribution centers to the located factories. It is supposed that factories capacities are constant; however, demands are stochastic in different scenarios. In the third decision part the network flow is determined in each period for each scenario. It makes the problem to be more intractable especially in large scales. Consequently we take advantage of genetic algorithm to solve the problem. A numerical example from the literature and the comparison of the proposed approach with other approaches shows effectiveness of the proposed approach.

Factory Layout Benchmark with Extended Failure Mode and Effect Analysis

Uwe Dombrowski¹, Christoph Riechel¹

'Technische Universitat Braunschweig, Germany
In this paper, a hybrid differential evolution algorithm (HDE) is developed for solving the no-wait flow shop scheduling problem (NFSSP) with sequence-dependent setup times (SDSTs) and release dates (RDs). The objective function to be minimized is total tardiness. Firstly, a largest-order-value (LOV) is utilized to convert continuous individuals in DE to job permutations. Secondly, differential evolution (DE) is used to evolve individuals in its population to execute effective exploration. Thirdly, a local search based on problem's properties and the insert neighborhood is embedded into DE to improve the exploitation ability. Due to the reasonable hybridization of exploration and exploitation, the NFSSP with SDSTs and RDs can be solved efficiently. Computational results show the effectiveness and efficiency of the proposed HDE.

Major Accident Prevention in the Planning Process of Offshore Operation and Maintenance Activities - Initial Study

Sizarta Sarshar¹

¹Norwegian University of Science and Technology/ Institute for Energy Technology, Norway

This paper presents the initial study on how major accident theories can contribute to major accident prevention in the planning process of offshore operation and maintenance activities.

Reliability and Maintenance Engineering (3) Session

Date Wed, 12 Dec Time 11:00 - 12:30 S228 Room

Chairs Ping Jiang, Bermawi Iskandar

Risk Metrics: Interpretation and Choice

Inger Lise Johansen¹, Marvin Rausand¹

¹Norwegian University of Science and Technology, Norway

This paper gives an overview of common risk metrics, maps them into a decision context, and suggests a set of evaluation criteria. The motivation is that risk analysis is carried out to inform decision-making, and that the content and perceived legitimacy of information from a risk analysis hinge on the metrics that are used to express the results. A tabular overview of the most common metrics for harm to people, assets, and the environment is given, with emphasis on clarifying their meaning, pros and cons. The metrics are linked to different decision contexts and stakeholder needs, and eleven criteria are established to aid in the choice thereof. Principal issues concerning the adequacy of single as well as sets of risk metrics are finally raised and make the basis for further work.

How to Develop the Grouping Strategy for Offshore Wind Turbines at the Wind Farm Level

Zafar Hameed1, Jorn Vatn1

¹Norwegian University of Science and Technology, Norway

Reliability and maintenance issues of offshore wind turbines are demanding due to lack of proven experience at hand. Grouping strategy is one of the possible ways to enhance the reliability and availability levels of the offshore wind turbines. In the proposed grouping strategy, it has been outlined how to optimize the maintenance tasks based on the age and conditions of the components and then group them together. In the realization of grouping strategy, the attempt has been made to address the certain issues and challenges pertaining to the set up costs, criteria for travel from one turbine to another, heuristics development, and exploiting the opportunities. In the current work, it has been proposed how to develop the optimal operational strategies based on the grouping technique. It is expected that realization of the propose approach would help in reducing the overall operational costs in a significant way for the offshore wind turbines and making them a more attractive and viable option for the investors.

Reliability and Spare Parts Estimation Taking into Consideration the Operational Environment - A Case

Abbas Barabadi¹, Behzad Ghodrati², Javad barabady¹, Tore Markeset³

¹University of Tromso, Norway

²Lulea University of Technology, Sweden

³University of Stavanger, Norway

Spare parts provision is a complex problem and requires an accurate model to analysis all factors that may affect the required number of spare parts. The number of spare parts required can be effectively estimated based on the reliability performance of the item. The reliability characteristics of an item are influenced not only by the operating time, but also by factors such as the operational environment. Therefore, for spare parts provisioning to be effective, the impact of these influence factors on the reliability performance of the item should be quantified. Hence, the statistical approach selected for reliability performance analysis must be able to handle the effect of these factors. One of the important models for reliability performance analysis that takes influence factors into account is the proportional hazard model (PHM), which has received less attention in the field of spare parts provisioning. In this paper the application of PHM to spare parts provision is discussed and demonstrated by a case study.

Using Piecewise Exponential Model to Schedule Preventive Maintenance Interval in Manufacturing Systems

Liangpeng Chen¹, Boray Huang¹, Loon Ching Tang¹, Min Xie²

¹National University of Singapore, Singapore ²City University of Hong Kong, Hong Kong

In this paper the piecewise exponential model is implemented to characterize the effect of corrective maintenance/repair which is conventionally treated minimal and ignored in reliability and maintenance literature. A repairable manufacturing system is studied which incorporates various costs, such as inventory,

production setup and maintenance. Besides repair, age based preventive maintenance is performed to replace the whole system. The preventive maintenance schedule is determined and system average cost rate within the preventive maintenance interval is minimized. Our study complements the literature by introducing discrete reliability growth model to study maintenance of manufacturing systems.

Simulation on Optimum Operation of Ship Main Engine Support System by Using System Dynamics

Dhimas Handani¹, Makoto Uchida

¹Kobe University, Japan

Operation of ship requires a reliable support system of main engine. This paper proposes new models in System Dynamics(SD) simulation for determining the reliability degradation of ship machinery components which are installed in main engine support system. This study purpose is to optimize the availability and minimize the total operation cost which are comprised of running, maintenance, penalty and downtime cost. Reliability analysis is taken into account based on failure rate data record. There are two SD models in this paper. An optimization model endeavors value of minimum Reliability Index(RI) as decision to obtain the highest availability and the lowest total cost. The forecasting model constructs the maintenance judgment when RI reaches the minimum RI in next subsequent voyage. Pumps which are operated in fuel oil, sea water cooling and fresh water cooling system are analyzed. Optimization model results optimum total operation cost and availability, while total operation cost in forecasting model is lower.

Reliability Optimization of a Series System with Multiple-choice and Budget Constraints Using a Genetic Algorithm

Alireza Zarei¹, Ahmadreza Zarei²

¹Hormozgan University, Iran

²University of Applied Science and Technology, Iran

This paper deals with a reliability optimization problem for a series system with multiple-choice and budget constraints. Choosing one technology for each subsystem and for maximizing the reliability of the whole system subject to the available budget, the optimization criteria are in used. We develop an efficient genetic algorithm hybridized with a local search step to solve the problem. In the approach, constructed solutions are not guaranteed to be feasible; accordingly, with use of an appropriate procedure, an infeasible solution is replaced by a feasible one. Through evaluating the proposed approach with the existing metaheuristic one which is available in the literature, the results show a better performance in computation for the algorithm which has been introduced here.

Optimal Replacement Threshold and Inspection Interval for Condition-Based Maintenance with Variable Failure Cost

Hamid Reza Golmakani¹, Morteza Pouresmaeeli¹

¹Tafresh University, Iran

In condition-based maintenance (CBM) with periodic inspection, the item is preventively replaced if failure risk, which is calculated based on monitoring information, exceeds a pre-determined threshold. It is also replaced if, at any time, failure occurs. In the determination of optimal replacement threshold, it is often assumed that the failure replacement cost is constant. However, this assumption is not always true as, in some practical cases; the failure replacement cost may depend on the item's degradation state at which the failure occurs and/or the time it fails. In this paper, derivation of optimal replacement threshold and optimal inspection interval for CBM with variable failure cost is provided. The basis is the control limit policy for CBM, already developed by the researchers and referenced in the paper. The proposed approach is illustrated through a numerical example.

Session E-Business and E-Commerce

Date Wed, 12 Dec Time 13:30 - 15:00 S228

Chairs Yi-Hui Liang, Bouchaib Bahli

Cultural Adaptations of Macau's Casino Hotel Web Sites

Chang Boon Lee¹, Stella Leong¹

¹University of Macau, China

Room

The objectives of this study are to (i)investigate the impact of Hofstede's cultural dimensions on the design and contents of Macau's casino hotel websites and (ii) evaluate the differences between the local Macau's casino hotel websites and the foreign casino hotel websites. The study uses content analysis as the research method. It covers seven main areas of web design and contents. These are Interaction, Information Architecture, Navigation Design, Information Design, Presentation Style, Image, and Text. The results indicate that each cultural dimension has impact on particular areas of web design and contents. Additionally, the Macau websites with foreign brand name show a high degree of localization in terms of the country-specific adaptations (such as languages that suit the customers) and the use of country-specific website address.

A Study of Impulse Buying in Virtual Communities

Guohong Wei¹, Chun Hu¹

¹Beijing University of Posts and Telecommunications, China

In theories and studies of Impulse Buying, residents' impulse buying in Virtual communities (VCs) has been ignored. The purpose of this paper is to provide an explanation of factors influencing impulse buying of Chinese residents in VCs, which can help the advertisers to develop better market strategies. The authors draw on Impulse Buying theories to develop a model of the influence mechanism of users in VCs on the behavioral of impulse buying. The model is tested using data collected among Chinese virtual communities' consumers. The findings illustrate the importance of advertising form, knowledge sharing in a virtual community, the virtual community favorite, impulse buying experiences, users' familiarity and individual instant decision to the residents of virtual communities' impulse buying. The findings of this study have important implications to virtual community or impulse buying researchers. The results of this study also have several important implications for practitioners of advertising in China.

Generic Modeling Propositions for Configuring, Sale, Product and Production

Linda Zhang¹, Elise Vareilles², Michel Aldanondo³, Petri Helo⁴¹IESEG School of Management, France

²University of Toulouse, France

³Toulouse University, France

⁴University of Vaasa, Finland

Facilitating product customization, configuration has attracted much attention from both academia and industry alike. However, the available studies and the reported systems focus on sales or product configuration while leaving other important issues in developing customized products unaddressed. In this study, we propose a new configuration concept: integrated SAles, Product and Production configuration (SAP2 configuration) to accommodate the entire product customization process. In this study, we focus on the underpinning configuration model: the generic bill of functions, materials and operations (GBoFMO) and discuss it in detail.

Evaluations of A Core Broking Model from the Viewpoint of Online Group Trading Pen-Choug Sun¹, Michael Odetayo², Rahat Iqbal², Anne James²

¹Aletheia University, Taiwan

²Coventry University, United Kingdom

A new Core Broking Model (CBM) is proposed to resolve group trading problems in e-markets. The aim of this paper is to evaluate the new model from the viewpoint of online group trading. A simulation system for the evaluations of new model was used to generate test data and to produce outputs from the core and the CBM. The results show that the CBM is superior to the core in distributed computing, computational complexity, and incentive compatibility when applied in e-markets. They demonstrate that the CBM can attract customers and deal with online group trading problems effectively in a large coalition. An extensive evaluation of the CBM has been made and shows that the additional techniques in the CBM have all successfully produced the desired result.

The Effect of Online Group-buying on Off-line Buying

Junfeng Liao¹, Xichen Dong¹, Xunqi Liu¹

¹South China University of Technology, China

The paper bases on the related theory of customer perceived value, and make a research on how online group-buying influence off-line buying decisions as a tool of promotion. The empirical results reveal that by joining group-buying business make a significant effect on off-line buying. Magnitude discount and product usefulness of group-buying both have positive effects on customer perceived value. However, product usefulness has a more significant effect on group-buying decisions indirectly via perceived value.

Study on the Loss of Social Welfare Caused by Search in the Market Based on the Asymmetric Information

Qiong Wang¹, Shixiang Huang¹

¹University of Anhui Agricultural, China

According to the traditional economics, the best efficiency of resources allocation is produced in perfectly competitive market. However, the conclusion neglects the dealers' "search" which is to get the complete information. This is a process which costs so much time that it has a big effect on the market equilibrium. As a result, the cost of search largely affects the efficiency of resources allocation. The study is based on the Asymmetric Information theory and the Search theory, it discusses the destruction to perfectly competitive market and the loss of social welfare caused by "search", and puts forward the solutions--advertisement and setting up the third agency

Session Project Management (2)

Date Wed, 12 Dec Time 15:30 - 17:30 S228 Room

Chairs Norbert Trautmann, Marie-Louise Barry

Entering the Nuclear Power Plant Supply Chain: the France Case Study

Giorgio Locatelli¹, Mauro Mancini², Gianluca Cocco², Valentino Ruzzon²

¹University of Lincoln, United Kingdom ²Politecnico di Milano, Italy

The so called nuclear renaissance is creating a huge market even though the criticality of the supply chain: few firms have the capabilities to work in this complex and demanding market, whereas many other are investigating the option to enter. The international scientific literature provides information regarding the governmental topics of nuclear power programs in different countries, but the analyses at firm level are almost inexistent. In particular it is unclear how an EPC (Engineering, Procurement and Construction) company can enter the supply chain (or project delivery chain). In order to answer this research question the paper investigates the French case study. First it investigates the pure historical facts and shows how French companies developed the national supply chain thanks to a strong governmental support. Then, the typical pattern used in a French NPP project is described analysing the five most relevant companies.

Bidding Decision Making in Construction Industry: An Analysis Based on Procedural Rationality

Zhuo Feng¹, Shuibo Zhang¹, Ying Gao¹, Fei Kang¹

¹Tianjin University, China

Through a literature review, we find that the bidding models based on rational theory have revealed little practical values by only taking into account of environmental constraints leaving bounded rationality neglected. This paper studies how bidders' cognitive limitations will affect their decision process in the framework of bounded rationality and we find that the satisficing rule and the aspiration level play a critical role. Cognitive limitations require the focus on how bidding decisions are made, so we give a procedure to guide bidders to realize procedural rationality. To test the efficacy of this procedure, further empirical or experimental research is needed.

Strategic Resource Planning Based on Staffing Profiles Eduardo Miranda¹

¹Carnegie Mellon University, United States

At any given time, an organization has a finite capacity to perform work and although this capacity could be modified, the process of acquiring or reducing the necessary resources takes time. Because of this, the organization needs to plan how much work to take in, or if a decision to change its current capacity is made, when and by how much. Failure to plan leads to paralysis by firefighting or to inefficiencies in the use of the available resources. This paper describes a method to efficiently do this based on the idea of staffing

Theory of the Triple Constraint - a Conceptual Review

C. Jurie Van Wyngaard¹, Jan-Harm Pretorius², Leon Pretorius³ ¹Graduate Universities of Johannesburg and Pretoria, Employee Saab Electronic

Defence Systems, South Africa ²University of Johannesburg, South Africa

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Projects are generally undertaken because they are part of the plans to meet business needs and charter organizations to new levels of performance. Projects are however constrained by conflicting demands and competing priorities within the project environment. Neglecting to manage these constraints accurately and effectively may be sufficient to condemn a project even if all other project management activities are performed to a high standard of excellence. The aim of this paper is to improve the interpretation of the triple constraint and its dynamics and indicate how this may advance the delivery of project success. An integrated model is proposed to facilitate the strategic management of the triple constraint trade-offs as a function of the project higher purpose.

Accounting for Risk Interactions and Using Importance Measures for Risk Prioritization in Project Management

Chao Fang¹, Xun Xiao¹, Xiaoyan Zhu² ¹City University of Hong Kong, Hong Kong ²University of Tennessee, United States

In this paper we present a method using importance measures for project risk prioritization. First, a simulation-based risk network

model is used to account for risk interactions. Various measures are then proposed to assess the risks and risk interactions with respect to their influence on the defined global risk exposure. An example of application to a real musical staging project is presented.

Perceptual Differences Between Project Managers and Sponsors in the Intiation Phase of a Project

Stephen Onu1

¹University of Maryland, United States

The information technology industry faces a growing problem of project failures with losses estimated at billions of dollars. The purpose of the study was to determine whether sponsors' and managers' perceptions differ during the initiation phase of a project life cycle, and whether differences have an impact on project performance. Respondents were dyads of sponsors and managers who were members of the Washington, D.C. chapter of the Project Management Institute. Results indicated no significant differences in perceptions of project performance as long as managers and sponsors shared a common definition of project success, and these interacting sponsors and project managers tended to perceive project performance similarly. Future researchers should consider using qualitative analysis to investigate sponsors' and managers' perceptions of the planning and executing phases to determine whether perceptual differences are magnified or minimized in these phases, as planning and execution are more complicated than project initiation.

Risk Management for Construction Projects with Colored Petri Nets: an Agent-Based Modeling Framework

Yangbing Zhang¹, Yongqiang Chen¹, Xingyu Zhu¹ ¹Tianjin University, China

Construction project is indeed a complex system, where many participants are involved and interact with each other. Risk interdependence brought up by interactions between participants is often ignored, which may lead to inaccurate risk assessment and inefficient risk management. This paper deals with the risk interdependence from a complex system's perspective. We first explained how the risk interdependence arises through the interaction between participants, to draw forth the idea of establishing an agent-based model to manage risks in construction project system. Then a framework using colored Petri nets (CPNs) to establish an agent-based model for construction project system was introduced. Its application to manage risks was also briefly illustrated. Further research is about to realize the CPNs models for the construction project system and put it into application. It is believed that studying the risk interdependence will be helpful to more accurate project risk assessment and better risk management.

On Deployment of Empowered Team Concept into Matrix Organization

Hanwei Xu1, Bin Lin1, Minmin Shen1

¹Siemens Ltd. China, China

The empowerment concept is a popular method of motivating people and increasing productivity. There are many studies conducted on it by management researchers and practitioners, but limited literatures have examined the challenges in practice and valuable experience. This paper proposes that the successful deployment of empowered team concept in a matrix organization shall have four phases: Preparation, Initiation, Definition, and Deployment. With an actual case from the joint venture of a multinational company, the good practices in defining the empowerment procedure, challenges met in implementation, and piloting results are discussed.

Robust Optimization of Project Portfolio Selection and Scheduling Problem with Stochastic Returns

Ying Li¹, Yongyi Shou¹

¹Zhejiang University, China

An improved robust optimization model for project portfolio selection and scheduling problem under uncertainty with stochastic returns is proposed in this paper. The scenarios are introduced to capture the uncertainty of project returns and an aggregate objective function is designed to balance the tradeoff between the return and risk of selected portfolio. The computational experiment on an example shows that the proposed robust optimization model has a good performance on the quality of solutions.

Session Global Manufacturing and Management (1)

Date Wed, 12 Dec Time 11:00 - 12:30 S229 Room

Chairs Chih Wang, Supachart Iamratanakul

Strategy for Virtual Factory Information System Design

Yuqiuge Hao¹, Ahm Shamsuzzoha¹, Petri Helo¹ ¹*University of Vaasa, Finland*

Rapid changes of today's global business environment demands for designing an advanced information management system as essential to share valuable knowledge and expertise among collaborative factories. With such perspective, a strategy for process based Virtual Factory Information System (VFIS) design is proposed in this research. This strategy provides not only a method but also a concrete tool for SMEs (Small and Medium Enterprises) to realized the VFs integration. The VFIS design optimizes VFs manufacturing processes and ensures faster response to changing customers demands. It will also support tight integration with external systems and contributes to visualize the virtual factory management systems. In this paper, new Virtual Factory Lifecycle and its Architectural Framework are also illustrated.

Virtual Enterprise Management: Perspective of Process-Based Business Collaboration

AHM Shamsuzzoha¹, Filipe Ferreira², Jose Faria², Americo Azevedo³, Yuqiuge Hao¹, Petri Helo¹

1 University of Vaasa, Finland

²INESC TEC, Portugal ³INESC TEC, Faculdade de Engenharia da Universidade do Porto, Portugal

The reality in today's business is to compete with dynamic and shorter market opportunities. In order to cope up with such environment, manufacturing firms, especially small and medium size enterprises (SMEs) are needed to collaborate with each other for mutual benefits. This collaboration offers process enhancement within the environment of virtual enterprise (VE) and contributes towards sharing costly resources and valuable knowledge among manufacturing companies. This research is basically focused on the process collaboration among companies that motivates them achieving identified business opportunities. A collaboration framework is proposed in this paper with respect to VE process mapping. Visualization of such processes is also highlighted though 'Dashboard' user interfaces in order to monitor and control a successful VE.

The Relationship among Country of Origin Effects, Brand Image and Purchase Intentions in Taiwanese Apparel Market

Chu Erh Hsiung¹, Cheng-Ter Ho¹

¹National Kaohsiung University of Applied Sciences, Taiwan

On account of increasing globalization, competitiveness between enterprises has significantly grown. To increase competitiveness and lower product prices, many managers decide to move manufacturing sites to different countries. Country of Origin effects have therefore become an important issue. This research explores how Country of Origin and brand image influences consumers' purchase intention. A conceptual model is designed to discuss the relationship among Country of Origin, brand image and consumers' purchase intention in Taiwan's apparel market. This research analyzes data concerning Country of Origin and brand image on consumers' purchase intention and finally concluded that brand image influences consumers' purchase intention more significantly than Country of Origin.

Scientific Catch-up Process in Asian Countries: A Case Study of Solar Cell

Ichiro Sakata¹, Hajime Sasaki¹, Hisato Tashiro¹, Aya Ishihara¹, Keiko Kayukawa¹

¹The University of Tokyo, Japan

A significant structural change in the pattern of economic development in Asian countries has been observed in recent years. In this paper we analyzed their scientific catch-up status using scientific papers on solar cells to clarify the structural change. We found as a result that the catch-up process in Asian countries had progressed rapidly, that some countries had a larger share of scientific papers in the frontier field of advanced science than in the matured fields, and that the strategy largely changed from country to country. A "parallel-running-type growth model" has thus been emerging in Asia. We also showed that bibliometrics is an effective method for presuming a detailed strategy that is not opened as policy.

Technology Gap, Market Experience and MNCs' Technology Licensing Strategies: Evidence from China

Lei Xiong¹, Xiaobo Wu¹, Rui Guo¹, Ruishe Zeng¹

¹Zhejiang University, China

This paper investigates the relationship between technology capability and licensor's strategies in international technology licensing. By using data of international patent licensing happened in China, we examine the technology gap's impact on the number of patent and exclusive right in licensing contract. And firm's experience in China positive moderates the relationship between technology gap and licensor's choice. Our results extend licensing theory and international business theory.

Using System Thinking to Investigate Co-Opetition Analysis for Manufacturers in the Cloud Industry

Chin-Yuan Fan¹, Sheau-Pyng Ju¹, Ming-Fong Lai¹ ¹National Applied Research Laboratories, Taiwan

Recently, cloud technology has become an emphasized field for development in the international communications and technology market. However, the definition of cloud services, whether competitive and cooperative behaviors exist in the overall process of the cloud industry, and whether co-opetition is only a beneficial cooperation and competition that enables manufacturers to expand the overall cloud market and develop the cloud industry are issues worthy of investigation. For this study, we employed a system dynamics model to explore co-opetition conditions among the manufacturers of the cloud industry. We further used this data to conduct strategic analysis from the perspectives of countries, industries, enterprises, and individuals to consider the development conditions of the cloud industry and propose appropriate development policies for the industry. The research results can assist the cloud industry in achieving sound and comprehensive development.

Session Global Manufacturing and Management (2)

Date Wed, 12 Dec Time 13:30 - 15:00 S229 Room

Chairs AHM Shamsuzzoha, R. Kant

Global Product Development: the Experience in a Brazilian Manufacturing and Assembler Automotive Subsidiary

Andre Segismundo¹, Paulo A. Cauchick Miguel²

¹University of Sao Paulo, Brazil

 $^2Federal\ University\ of\ Santa\ Catarina,\ Brazil$

The literature identifies a trend of new vehicles development at global level resulting in a global product development (GPD). In this context, this paper aims at analyzing the decentralization of GPD in an assembler of commercial vehicles. Factors that contribute to the decentralization of GPD are considered in this investigation as well as their causes. Case-based research is adopted as the research methodological approach, conducted in a Brazilian assembler and its headquarters in Germany. The results indicate that the organization reacts similarly to other economics industrial sectors (e.g. telecommunications) when facing the decision of decentralizing GPD. Unlike other studies, it was also found that modular design has influence on the GPD decentralization process. The interest of the local market and historical aspects of the evolution of the subsidiary were found to be relevant. From these results a proposed structure for GPD and adoption of modular design is suggested.

The Impact of Guanxi on Internationalization Entry Mode for Chinese Enterprises: A Multiple-Case Study Rongjun DU¹, Xiaobo Wu¹, Xubo Bai¹

¹Zhejiang University, China

Two types of guanxi in Chinese context have aroused scholars' concern in recent year. Through a multiple-case study, this paper discussed how guanxi with governments and partners influence on the internationalization of Chinese enterprises. Four manufacturing companies from Zhejiang and Jiangsu Province typically reflects the positive impact of guanxi on the internationalization. Mode of Greenfield relies much more on the guanxi with governments while the mode of export prefers the guanxi with partners.

Latest Developments Aiming an Integrated Management **System Tool Focusing Maturity Assessment**

Jose Pedro Teixeira Domingues¹, Paulo Sampaio¹, Pedro Arezes¹ ¹University of Minho, Portugal

Integrated management systems (IMS) widespread among companies due to the release, by international entities, of management sub-systems implementation standards. integration level achieved by the IMS varies from company to company. Rating the integration level is crucial information. Maturity models have been implemented in several business, product development and in management sub-systems context in order to guide the company to an ultimate excellence level. An IMS maturity model development is, currently, aimed by researchers and a real need in companies. It is intended in this paper to report the efforts that are being made and the methodologies that are being followed to develop such a model. Additionally, it is also intended to present a preliminary model version.

Facilitating Customer Involvement Into the Decision-making Process of Concept Generation and Concept Evaluation for New Product Development

Chih-Hsuan Wang¹

¹National Chiao Tung University, Taiwan

Customer-preference based market segmentation could offer numerous business synergies to achieve successful new product development, such as: (1) learning which product attributes are most critical to distinct segments, (2) identifying niche segments to assist an enterprise in generating design concepts, (3) helping product managers better predict customers' desires to effectively implement promotion plans. In this study, a novel framework integrating conjoint analysis with Kano model is proposed to address the aforementioned issues. By virtue of conjoint analysis, customer preference is initially formulated through their perceived importance degrees of critical attributes and the entire market is segmented accordingly. Thereafter, for distinct segments, conjoint analysis is employed again to extract customer utilities of critical attributes while Kano model is used to elicit customer delight/disgust of optional attributes, respectively. Finally, a real case study on generating and evaluating various design alternatives of a smart-phone is demonstrated to validate our proposed approach.

Information Interpretation-oriented Integration Interface for Manufacturing Enterprises

Changyu Chen¹, Gang Zhao¹ ¹Beihang University, China

Information interpretation obstacles greatly threat the usability of manufacturing enterprise information systems. This paper discusses the problem of information interpretation followed by system integration of manu-facturing enterprises. It then proposes information interpre-tation-oriented integration interface for manufacturing enterprises to solve the problem of information interpretation obstacles after information modules integration.

Session Safety, Security and Risk Management (2)

Date Wed, 12 Dec Time 15:30 - 17:30 S229 Room

Chairs Bouchaib Bahli, Sung Shim

Value Drivers in Supply Chain Security

Lea Hannola¹, Ville Ojanen¹, Sirra Toivonen², Tuomo Kassi¹ Lappeenranta University of Technology, Finland

²VTT Technical Research Center of Finland, Finland

Understanding and assessing the value of security and disturbance management in supply chains is a significant challenge for logistic solution providers. The objective of this paper is to identify and prioritize the key challenges and value drivers of disturbance management, which can be utilized in the development of security solutions for customers. Further, the study clarifies the key concepts of security, disturbance management and value assessment in logistic multi-stakeholder networks. The value drivers are derived from multiple perspectives. The data has been collected in an expert session and also with semi-structured theme interviews, conducted in five companies representing different roles in a logistic network. As a result of the study, the most significant value drivers of disturbance management in the logistic network are identified and analyzed, and a new framework for categorizing the key value drivers of disturbance management is created.

Development of a Barrier Management System for Continuous Monitoring and Maintenance of Safety **Barriers**

R.M. Chandima Ratnayake¹, Sukvir Panesar Singh², Jawad Raza² ¹University of Stavanger, Norway

²Apply Sorco, Norway

Reducing the risk of major accidents in the oil and gas (O&G) industry is one of the main priorities for operator and engineering contractor companies as well as for regulatory authorities. Weaknesses or failure of safety barriers may lead to serious consequences in the form of major accidents. Unexpected equipment inadequate maintenance, and weaknesses human/machine interface can be some of the causes of weaknesses or failure of safety barriers. Safeguarding barrier integrity is vital over the life cycle of an O&G installation to ensure safe operations. A Barrier Management System (BMS) is important for monitoring the performance and technical degradation of the equipment that could lead to impairment of barrier integrity. The BMS also enables visualization of the integrity status of safety barriers, which enables the managers to initiate mitigating actions as soon as barrier integrity impairment is noticed. This manuscript illustrates a methodology used for the development of a Barrier Management System, based on industrial experience, for an operator company functioning on the Norwegian Continental Shelf.

How Can We Improve Healthcare Management for Patient Safety by Analyzing Large-Scale Incident Reports?

Masanori Akiyama¹, K Fujita¹

¹The University of Tokyo, Japan

The analysis of medical incident reports is indispensable for patient safety management. Most of the incident reports include free descriptions, however, the analysis of free descriptions aren't enough in the medical area. We aimed to accumulate, to interpret information again by structured incident information, and to clarify the point that should be improved for the cause of the accident and safe medical treatment improvements in the present study. We employ the natural language processing and the network analysis for detecting effective categories of Medical Incident Report. The network analysis can find various relationships that are not only direct relationships but also indirect relationships. We detect the new categories based on the network analysis and compare between existing categories based on expert's decisions and bottom-up ones. By the network analysis using the large number of incident reports, some of new perceptions for improving the patient safety management are appeared.

Prediction of Soleplate Corrosion in Petroleum Storage Tank Based on Grey Model GM(1,1)

Xiao-gang Zhao¹, Yi Zhou¹, Fei Cheng¹, Jian-cheng Zhu², Jie Zheng²,

De-peng Gao ³ ¹Logistical Engineering University, China

²Beijing Military Region, China

³Jinan Military Region, China

The corrosion protection of petroleum storage tank is important for safety work in petroleum depot. Precise prediction of soleplate corrosion may reflect the security state of a storage tank, and it can provide scientific references to the anti-corrosion and maintenance in safety management. Grey Model GM(1,1) in the Grey Theory, which is programmed by MATLAB, is introduced and applied to predict the soleplate corrosion of No.G-2 petroleum storage tank in Luquan oil depot. Compared with the measurements, the prediction results meet them very well, which shows that this model is practical, fast, and convenient. Meanwhile, it can reflect the status and the corrosion rate of a petroleum tank. Therefore, it is suitable for wide applications in other relative fields.

Modeling and Reliability Assessment of a 3-channel Safety-instrumented System

Yiliu Liu¹, Marvin Rausand¹, Hui Jin¹

¹Norwegian University of Science and Technology, Norway

Safety-instrumented systems (SISs) are of-ten crucial in the prevention of accidents. In this study, several reliability assessment methods, including the ap-proximation formulas in IEC 61508 and in the PDS hand-book, and Markov and Petri net methods, are used to determine the reliability of a redundant SIS configuration with three parallel channels. The average probability of failure on demand (PFDavg) is used as reliability measure, and common cause failures and proof tests are considered in the modeling. The results obtained by the different methods are compared, and characteristics of these meth-ods in SIS reliability analysis are discussed.

Dynamic Measurement and Evaluation on Foreign **Exchange Risks of International Construction Projects**

Xiuqin Wang¹, Bin Gao¹

¹Tianjin University, China

Due to the complex economic and political situation of the world, China's international construction engineering enterprises are faced with great risks and challenges in the overseas markets, among which the foreign exchange risks have become increasingly prominent. The payments and costs of international construction projects are generally denominated in different currencies and thus the exchange rate fluctuations during the whole contract period can cause severe losses for the projects. This paper identifies foreign exchange risks of international construction projects, develops a dynamic measurement and evaluation methodology on foreign exchange risks based on the net present value at risk method in order to facilitate the international construction contractors to measure and evaluate foreign exchange risks and take effective measures in time. Finally, a case analysis is advanced and the feasibility and effectiveness of the methodology are validated.

Resilience Measurement for A Class of Supply Chain Disruption

Shu Yi¹, Xinping Wang¹, Lindu Zhao¹, Micheal Herty²

¹Southeast University, China

²RWTH Aachen University, Germany

As a recently concerned engineering and management topic, supply chain resilience is aimed to respond to the threat from the increasingly instable economic environment and disruptive events that might occur at any time. With an insight in the research background of supply chain resilience, this article make an analysis and description of this conception. Based on the understanding of supply chain resilience, a measurement method is proposed to quantify supply chain resilience after a class of disruption where one supplier could hardly recover in the short term.

Estimating the Remaining Useful Life of Li-ion Batteries with a Bayesian Updating Model

Yizhen Hai¹, Jie Tang¹, Kwok Leung Tsui¹

¹City University of Hong Kong, Hong Kong

In this paper, we studied a prediction method for the remaining useful life of Lithium-ion batteries. First, a battery degradation model is obtained based on exponential degradation signal modeling with data collected from second generation 18650-size lithium-ion cells from NASA. Using a Bayesian updating procedure, we then obtain the conditional cumulative distribution function (cdf) of the residual life of the battery at various time intervals. Finally, we discuss this method and draw the conclusion that the model is accurate in terms of prediction.

Session Poster Session 2 Wed, 12 Dec Date Venue Level 2 Foyer

Reliable Joint Inventory Location Problem with Penalty **Cost and Capacitated Facilities**

Elham Taghizadeh¹, Mostafa Abedzadeh¹, Mostafa Setak¹ ¹K.N.Toosi University of Technology, Iran

Logistics network design includes assignment of locations and capacities for new facilities, procurement and production planning and distribution. It is expected opened facilities work properly for a long time horizon. In most cases consider that all facilities will work constantly without any failure; but in real world problems, facilities may face disruptions. This paper studies a reliable joint inventory location problem that optimizes facility locations, customers' assignment, and inventory management decisions when facilities are subject to failure risks. The model is proposed based on p-median problem and the facilities are considered to have limited service capacities. Our model has an objective that minimizes the sum of facility construction costs, expected inventory holding costs and penalty cost. Since the model is NP- hard, for solving this model we use NSGAII algorithms. Numerical experiment results show this proposed model is suitable of providing a near optimum solution within a short computation time.

Impact of Customer Response to Retailer Stock-out on Supply Chain Performance

Xiaoling Zhang¹, Qiang Lu¹, Teresa Wu²¹ ¹Harbin Institute of Technology Shenzhen Graduate School, China

²Arizona State University, United States

Considering the ultimate goal of a performing supply network is to deliver products/services to the end customers, this paper studies how customers respond to stock-out (a post-disruption event) and how different patterns of customer response affect the supply chain performance, for which a high level Petri-net is developed to model a supply network with two brands of product and two stores, followed by a detailed simulation. Five different patterns of customer behavior are incorporated in the model to quantitatively assess the correlation between customer response and supply chain performance represented by bullwhip effect, on-hand inventory, and backlog level of both the stock-out brand and the competing brand.

Pricing and service level strategies based on customers

Junxiu JIA1, Z. Yuan1

¹Xidian University, China

The paper focuses on a service supply chain with a service customer, a service provider and online shoppers. The service customer makes products pricing strategies and determines the coefficient of sharing costs with the service provider. Products demand depends on not only online shoppers' buying sensitivities but also their behavior intention, such as the probability of repeated buying. The service provider sets service price and service levels. We propose optimal models and obtain following conclusions. There exist the optimal combined service pricing and service level strategies for the service provider. The service customer can also get optimal products pricing policies and an optimal coefficient of sharing the cost under a condition. The numerical example shows that the probability of repeated buying has a monotonous effect on all strategies.

A Simulation Based Experimental Investigation of Demand and Supply Uncertainty

Carman Ka Man Lee¹, Rohan Pasari²

¹The Hong Kong Polytechnic University, Hong Kong

²Nanyang Technological Unviersity, Singapore

This paper proposes a model that can be used by organizations to better plan their procurement strategies and hedge their demand and supply uncertainties. The conventional way of procurement planning, which is usually based on estimation and experience, lack of scientific analysis. Risk Solver platform in MS Excel is used to formulate a simulation model from a buyer's perspective, incorporating the following demand and supply uncertainty elements: stochastic demand, uncertain yield, and spot market price variability. Monte Carlo simulations are then used to determine the optimum procurement quantity and the profit maximizing point. The originality of the paper is to study how the optimal procurement decisions are made under demand and yield uncertainty in the presence of spot market. A framework is also developed to understand the impact of different uncertain variables on the firm's profits

Forecasting Product Returns Using Causal Analysis and Multiple Linear Regression

Shantanu Chakraborty¹, Rajesh Kumar¹, Prasanna Akella¹, Satyendra

¹Hewlett Packard, India

Some of the key challenges in managing reverse logistics operations are, getting a visibility into the expected product returns in the future and increasing the speed of the returns management process. Accurate forecasting of non-performance related product returns helps to plan better for repair parts, faster refurbishment and lower mark downs on their remarketing. Effective management of product returns helps organizations build a sustainable and environment friendly business model by improving their financial performance in the short run and reducing product scraps in the long run. Our paper focuses on using a statistical hypothesis framework to develop the causal drivers for product returns. We showcase how these causal drivers can be converted into a multiple linear regression model to generate accurate forecasts for product returns not only in quantity but also in their timing. We also discuss the deployment of the methodology in personal computer business generating significant dollar impact.

Evaluating Retailer Consumer Return Policy under VMI Partnership

Shahrokh Hematyar¹, S. Kamal Chaharsooghi²

¹P.N. University, Iran

²Tarbiat Modares University, Iran

This paper investigates decisions of a supply chain consisting of one manufacturer and one retailer where supplier retains ownership of the inventory and gets paid from the retailer based on actual units sold. Market demand for the product is price-sensitive and uncertain. We study and compare two different scenarios. The first, retailer facing only demand uncertainty (VMI), while the second scenario, retailer faces stochastic demand and consumer return (VMI-R). With the increase in product variety, consumers may feel uncertain about whether specific items fit their needs. Retailer uses consumer return policy as a sign of high quality of product and to increase customer satisfaction. We integrate consumer returns policy and VMI within our model. We show that with refund policy, the supply chain loses at least 26.4% of its first-best (expected) profit, while without refund it loses just as much or no more than 26.4% of the first-best profit.

Decision Aided Tool for Recycled Spare Parts Management Under Uncertainties

Nouha Ghorbel¹, Sid-Ali Addouche², Abderrahman ElMhamedi², Younes

¹University of Paris 8, France, University of Sfax, Tunisia

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The legislative constraints, the need to optimize the dismantling process, the introduction of recycled parts on the spare parts market are reinforced since the systems in end-of-life phase have become increasingly profitable. There are few works that treat recycled spare parts integration problem in economic models of inventory control. These works do not consider uncertainty. In order to manage more realistically the inventory control of spare parts, we propose a probabilistic model formalized by a Bayesian network. The model is used to identify the best purchase policy. More precisely, it allows choosing the best proportions between new spare parts (NSP) and recycled spare parts (RSP) by taking into account the traditional criteria of inventory control and the availability of the spare parts on the market. The proposed method provides a decision-making tool for manufacturers who are interested both in reducing the costs of stocks and guaranteeing a minimal availability in an uncertain environment.

An Integrated Method of Hierarchical Planning and "Pull-way" Production Control for Lean Shipbuilding

Mingdi Zong¹, Houfang Sun¹

¹Beijing Institute of Technology, China

Issues are investigated when shipyards are trying to manage their receding horizon plan and control their production process in a "pull" way, based on the principle of lean manufacturing. A hierarchical planning and "pull-way" production control integration system model is established, which provides the shipyards architecture of realizing the lean manufacturing in planning and production control area. Then, a production control method is introduced where the bottom level is based on pull principle, while under the restriction of receding horizon plan. The study reveal that

even under the "make to order" production mode of shipbuilding, it is still possible to establish a leanness oriented planning and production Control system, where the receding horizon plan can work well together with the "pull-way" production control. The result of a production process simulation is introduced at the end of the paper, to validate the advantage of the suggested control method.

Optimal Control of a SOM System with Demands for Product and PSS

Kangzhou Wang¹, Zhibin Jiang¹, Tongyi Wang¹, Guowei Li¹ ¹Shanghai Jiao Tong University, China

In this paper, we address the problem of optimal control in a service-oriented manufacturing (SOM) system. The optimal dynamic admission control of the product orders and the optimal dynamic production control of products are examined simultaneously. We formulate the integrated optimal control problem as a continuous Markov decision process. and characterize the integrated optimal dynamic control by two monotonic switching curves. The optimal control policy highlights the coordination between the controls of manufacturing subsystem and service subsystem in the SOM system. We also illustrate the impacts of the revenues of both product orders and PSS orders on the optimal policy numerically.

A Due Date Assignment Method based on LOMC

Hao-yun Yan¹, Bin Wu¹, Hong-yu Li² Shanghai Dian Ji University, China ²Fudan University, China

In this paper a due date assignment method based on LOMC (Load-Oriented Manufacturing Control) has been presented that is applicable to discrete MTO (Make to Order) environments facing dynamic order arrivals. As a capacity-driven approach, this method considered the influence exerted by LOMC mechanism and determined the possible release date of an arriving order, according to the workload information of the order and current available capacity of the manufacturing system. Then the due date of the order could be obtained. Meanwhile, LOMC mechanism and the dispatching rule were adjusted to comply with the plan arranged by this method. Simulation experiments were carried out to compare this method with several due date assignment methods previously examined in the literature. Simulation results verified its effectiveness and several important conclusions were obtained.

Analysis of the Life Cycle Trend of the Export Market of Taiwanese Bicycle Industry

Leichuan Lin¹, Shan-Yau Wu¹

National Kaohsiung University of Applied Sciences, Taiwan

With the Bass Model of the diffusion theory as tools and the export volume and the export price of Taiwanese bicycles as variables, this research calculated the innovation and imitation abilities, as well as the market potential, shown in European, American and Asian markets through optimized adjustment of innovation coefficient (p) and imitation coefficient (q), and further explored the characteristics of the export markets of Taiwanese bicycles. The study found that the unit price of the products not only reflects the consumption characteristics of the markets, but is also positively correlated with the innovation ability. This research can not only provide decision-makers reference for prediction of product life cycle trend, but also offer assistance to future studies using Bass Model to predict the sales volume.

A Novel Formulation for Unit Commitment With Wind **Power Considering Production Cost of Every Generator**

Guowei Hu1, Zhaohong Bie1, Bowen Hua1

¹Xi'an Jiaotong University, China

This paper presents a novel Unit Commitment (UC) formulation with wind power considering production cost of every generator. In the proposed formulation, the subsidies will be provided for those generators whose production cost per MWh rises due to wind power integrated into power system. In order to avoid exorbitant subsidies for inefficient generators, the objective function of the proposed UC formulation is to minimize the sum of the total production cost and subsidies. In addition, two improved models considering storage devices and demand response are proposed in order to reduce the impact of the anti-peak regulation characteristics of wind power. The simulation results of conventional UC show that the power production cost per MWh of most generators rises remarkably owing to the integration of wind power, and the proposed UC formulation is more reasonable and effective. Meanwhile, the improved models are effectual to overcome anti-peak regulation characteristics of wind

power and reduce total production cost and subsidies, while the model considering demand response seems to be more promising.

Orders Tracking and Production Visualization Oriented Lean Production

Jialin Han¹, Yaoguang Hu¹, Jingwen Li¹, Qiqi Yin¹ ¹Beijing Institute of Technology, China

In current industrial area, opaque information of order tracking and production process seriously impedes the promotion of lean production. In order to solve this problem, the method of order tracking and production visualization is studied. The model of business activities and information chain in manufacturing process is raised up. And information collecting method based on key nodes and information analyzing method based on event are discussed. In order to satisfy the requirements of order tracking and production visualization of an electronic component company, the system of orders tracking and production visualization oriented lean production is designed to provide accurate data and information to promote lean production.

An Adaptive Approach to Failure Modes and Effects Analysis for Computer-aided Inspection Planning

Shirin Mirdamadi¹, Ali Siadat¹, Jean-Yves Dantan¹, Lionel Roucoules¹ ¹Arts et Metiers ParisTech, France

In robust design, the principle is to improve product quality minimizing the impacts of variations. Variability depends strongly on the set of explicit and implicit decisions taken during product design, selection of methods, processes and resources. This paper presents a new approach to decision making for inspection planning. The proposed approach requirements are then emphasized. As well the necessity of quality management tools integration in decision making is concluded. Literature review highlights that each already existent quality tools satisfies partially these requirements. Among these latter FMEA is considered to be flexible and apt enough to be adapted to CAIP. Despite, improving points to FMEA are discussed and required modifications are then proposed. Future works are as well presented.

Problem Transformation Approach to Solve the Single-machine Scheduling Problem with Availability Constraints

Kenta Takii¹, Shunii Tanaka¹

¹Kyoto University, Japan
This study addresses the single-machine scheduling problem with availability constraints. For this problem, we consider two types of maintenance activities, fixed and flexible, and two types of jobs, nonresumable and resumable. Hence there exist four combinations of problem settings. The purpose of this study is to show that all these four types of problems can be transformed into the ordinary single-machine scheduling problem without availability constraints. This enables us to apply well-developed exact algorithms for the ordinary single-machine problem to our problem. It will be demonstrated by numerical experiments that several types of instances can be solved efficiently by this transformation approach.

Practical Order Release Planning Linking Enterprise and Shop Floor Tracking Systems for High-Mix Low-Volume

Tay Jin Chua¹, Tian Xiang Cai¹, Feng Yu Wang²

Singapore Institute of Manufacturing Technology, Singapore

2Singapore Institute of Manufacturing Technology, Nanyang Technological

University, Singapore Untimely or uncontrolled release of work orders into production creates variance in production and in turn leads to high

work-in-process and increased average throughput time, high conversion rate and unbalanced production line. In the HMLV manufacturing environment (e.g. Precision Engineering industry), the massive product mix, low production quantity, and the multitude of production constraints make it virtually impossible for human beings to manually optimise the correct product mix to be released to the production. In this paper, a work order release system was implemented to bridge the gap between the enterprise planning and shop floor execution. It faciliates the management of the sales order by generating and releasing the work orders into shop floor, considering the finite capacity constraints. It also communicates with the shop floor tracking system during execution of the work orders. Working togther, these two systems facilitate the management of unplanned stochastic and dynamic events.

A New Intuitionistic Fuzzy Cosine Similarity Measures and Its Application

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Recent several researches have developed similarity measures method for handling pattern recognition problems based on intuitionistic fuzzy sets. However, in some cases, those proposed method can not give sufficient information to discriminate from some patterns. Therefore, the purpose of this paper is to present a new similarity measures model based on intuitionistic fuzzy sets. This proposed method is provided to enhance measure accuracy degree of similarity between basic pattern and each sample, so as to give additional information for decision makers. A comparison between previous existing methods and our proposed method has been discussed. In addition, an application for radar target identification has been illustrated through using the proposed method.

Performance and Efficiency Measurement for Canadian **Bank Branches**

Zijiang Yang¹, Yuanyuan Luo¹, Younes Benslimane¹ ¹York Üniversity, Canada

In today's economy and society, the banking industry is of great importance to every one of us. We all depend on the efficiency and quality of services that the banking industry provides. This paper presents an evaluation of 726 branches in one big Canadian bank using Data Envelopment Analysis (DEA). A variety of internal and external factors were used to identify the factors that affect the branch performance. Findings from this study suggest that branch size, number of commercial customers, number of high value customers and average household income in the branch area significantly affect bank branch's performance. All the findings are discussed in the context of the Canadian banking market.

Fuzzy Random Possibilistic Programming Model for Multi-objective Problem

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A real-life application faces various kinds of inherent uncertainties which occurs simultaneously. To find solution, formulating real world problem into mathematical programming model is challenging. Uncertain parameters in a problem model can be characterized as vagueness, ambiguous and random of the information. Such uncertainties make the existing multi-objective model incapable of handling such situations. Thus, in this paper we present the multi-objective decision model from the perspective of possibilistic programming approach to scrutinize the uncertainties in the decision making. The proposed concept can be used to build model for multi objective problem which is exposed with various types of uncertainties. We include an illustrative example to explain the model, and highlight its advantages.

Effect of Market Orientation on Performance: An **Empirical Study**

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The hairdressing service sector belongs to the market-oriented industry. This study explores the effect of market orientation on performance for the 31 chain stores belonging to a hairdressing company in central Taiwan. The market orientation variables involve four dimensions, including service quality, customer orientation, competitor orientation and interfunctional coordination. Return on investment (ROI) and discriminant function value (DFV) are used as the performance measures. OLS-regression analysis is used to test the market orientation effect on performance. This study exhibits that DFV can suitably represent the ROI level, and more importantly, DFV plays a better measure than ROI to act as the outcome variable. The analysis results indicate that competitor orientation and interfunctional coordination can be the useful tools in the market orientation progress, which mainly relate to the improvement of business performance.

A Game Theoretic Model for Analysis of Material Reuse

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The rational of incorporating material reuse considerations into modular design has been well recognized. The key technical challenge, however, lies in that such material reuse modularity must be consistent with and conform to the legacy structure of a technical system. This paper is geared towards a total system approach and introduces a game theoretic approach to joint optimization of technical system modularity and material reuse modularity. A bilevel optimization model is put forward for modularity decisions while leveraging material reuse. A case study of refrigerator modularity analysis is reported.

The Impacts of Product Delay Cost on Rush Order Decision for Job Shop Production Systems

Min Wang¹, Cheng-Yu Huang², Chun-Yuan Cheng¹ ¹Chaoyang University of Technology, Taiwan ²WIN Semiconductors Corporation, Taiwan

In order to meet the customer's special requirement, manufacturers tend to produce the variety of products nowadays. High-variety low-volume productions plan becomes the major production style for job shop plants. Moreover, the production managers usually encounter rush order inserting problem. In this study, a simple decision rule is provided to reduce the decision procedure for the manager to solve the rush order problem.

Application of Undesirable Input-Output Two-Phase DEA Model in Environmental Performance Audit

Rongbing Huang¹
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The widespread concern for environmental issues provide a rare opportunity for the development of environmental audit. In this paper, Data Envelopment Analysis is applied in the environmental performance audit of energy saving & emission reduction fund, considering the deficient in assessing efficiency in traditional DEA model, an improved algorithm for DEA model is brought out, which realizes the solution to DEA model for pollutant undesirable inputs and outputs, and also overcomes the 'relative efficiency' defect in DEA algorithm. This study is to offer an analysis of ideas for addressing 'evaluation difficult' in environmental performance audit, and help to promote the application of environmental performance audit in energy saving & emission reduction to a high-end direction.

The Experiment and Numerical Simulation for Hydro-mechanical Deep Drawing Process

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A finite element simulation model for new-type Hydro-mechanical deep drawing process is build with the structure of the tooling. A serious of numerical simulation, general deep drawing, ideal deep drawing and Hydro-mechanical deep drawing process, for 95mm-diameters blank are done. Based on those numerical simulation results, the influence of different constitutive models on drawing force-drawing height curves is discussed. Especially based on the simulation results of passive pressurized Hydro-mechanical deep drawing process, the process parameters, equivalent stress, equivalent plastic strain, are described. And the influence of coefficient of friction and the different constitutive equation on simulation is analyzed in addition.

Experimental Investigation of the Influence of the Different Loading Conditions on the New Type Precision **Bar Blanking System**

Bin Zhong¹, Shengdun Zhao¹, Renfeng Zhao¹, Fan Xu¹
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An experimental investigation was carried out to determine the influence of the different loading conditions on the blanked-billets cross-section quality and blanking time with a new precision blanking method. The loading rules are clearly explained as well as the loading sequence. Meanwhile, a new cross-section quality assessment method is proposed in accordance with the characteristics of the blanked-billets cross-section. Moreover, the tests adopt the ideal control curves: the frequency-time control curve with a linear decrement slope 1Hz/s and the radial displacement time control curve with a linear increment slope 0.01mm/s. The experimental results indicate that the quality of the cross-section is in turn: two perpendicular-distributed hammers, four hammers, three hammers, single hammer, two symmetric-distributed hammers. The blanking time from short to long is in turn: four hammers, three hammers, two perpendicular-distributed hammers, single hammer and two symmetric-distributed hammers.

RCPSP with Partially Renewable Resources and Resource Consumption during Setup Operations

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²Mitsubishi Electric Corporation, Japan

In terms of energy consumption, the environment surrounding manufacturing industries has been becoming considerably severe. In this paper, we elaborate a new RCPSP formulation that can deal with realistic energy constraints relating to energy consumption during peak hours, contract demand, and energy consumption during setup operations. This paper also proposes a heuristic mode restriction algorithm for the reduction of computation time. Results of empirical evaluations show that the proposed formulation and algorithm are effectual and efficient, respectively.

Design and Actualization of IoT-based Intelligent Logistics System

Zhiqiang Xu¹, Jialiang He², Zhiyong Chen³ ¹Nanyang Technological University, Singapore ²Northeast Petroleum University, China ³Chengdu Wisdom Technology Čo.Ltd, China

Modern logistics is represented by the supply chain management and service of enterprise production and transportation, while the combination of intelligent transportation technology and logistics management will conduce to significant improvement of logistics service. The objective of IoT-based Intelligent Logistics System is elaborated here. After introducing the intelligent model of such logistic system, its logistic framework is constructed, and the actualization and application of a RFID-based logistics tracking and management system targeting at manufacturing industry are designed. It highlights the key points for the systematic development of current logistics are put forward.

Keshtel Algorithm (KA); A New Optimization Algorithm Inspired by Keshtels' Feeding

Mostafa Hajiaghaei-Keshteli¹, Majid Aminnayeri¹ ¹Amirkabir Úniversity of Technology, Iran

We study the unusual feeding behavior of Anas family (especially in Anas Clypeata, or similarly in Anas Crecca), in order to employ in designing an optimization algorithm. These dabbling ducks are called Keshtel in the north of Iran and we use this term in naming the algorithm. Keshtel Algorithm (KA) starts with an initial population which is called Keshtels. The feasible space is the lake where the Keshtels are landed and search to find foods. The lucky Keshtels find better food in the lake and their neighbors move toward the lucky Keshtels to find more and better foods in swirling way. Its simplicity to use, moving just toward the better solution in the intensification phase, and using the nearest neighbor to shovel the possible area, are the novelty approaches of the KA. Application of the proposed algorithm to some benchmark functions has proven its capability to deal with optimization problems.

Robust Remaining Useful Life Prediction for Li-ion Batteries with a Naive Bayesian Classifier

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This paper presents an empirical procedure for predicting robust remaining useful life (RUL) using a naïve Bayesian classifier (NBC) with time as the response. The method is illustrated using public data for predicting Li-ion battery RUL to end-of-life (EOL). A battery life prediction is obtained using the capacity values up to the prediction time. The root mean squared error (RMSE) is used for performance evaluation. The predictions over time are compared with the actual time to EOL for each test battery and the RUL is calculated at four time intervals. The prediction performance of the NBC is compared with that of a support vector machine (SVM). The case study shows that the NBC generates competitive prediction performance, even though other factors contributing to Li-ion battery

degradation are concealed. This method is also applicable to predicting RUL to end-of-discharge (EOD) and the failure prognostics for other components.

An Integrated Study in Determining the Optimal Policy for Warranty, Pricing and Production of Repairable Products under FRW

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Warranty plays an important role in the market, not only safeguarding the rights and interests of consumers but also promoting the sales and reputation of manufacturers. Due to its impact on the market, manufacturers should take their warranty policies into consideration in developing an integrated marketing strategy which can promote a product by simultaneously considering pricing, production, and related post-sale services. In this paper, we made an integrated study and proposed a mathematical model and the corresponding solution algorithm to help manufacturers systematically decide warranty, pricing and production. The failure times for the product in our study were drawn from a non-homogeneous Poisson process with a specific intensity function. A preventive maintenance program was also included along with warranty. Finally, a hypothetical application case was used to demonstrate the effectiveness of the proposed model.

Servicing Strategy and Preventive Maintenance for Products Sold with One-Dimensional Warranties

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A manufacturer sells its product with a longer warranty period in order to increase the product competitiveness. Offering a product with a longer warranty period increases the warranty cost to the manufacturer. For a repairable product, an appropriate servicing strategy can reduce the warranty cost significantly. Many servicing strategies involving replacement or imperfect repair have been studied in the literature. In this paper, we study a servicing strategy which considers preventive maintenance and imperfect repair to reduce the warranty cost.

An Acceleration Method for the Permutation Flow Shop **Problem Minimizing Total Flow Time**

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⁴Loyola University, United States

Many metaheuristics have been developed to solve the permutation flow shop scheduling problem with minimized total flow time. Quite a few of these have a local search algorithm embedded that often consumes most of the computational time. In this paper, a method is proposed to accelerate the computation of the local search. The accelera-tion method is based on the concept of critical path. By using the method, it is not necessary to compute the full new schedule generated by moving a job from its current position to another when it satisfies certain conditions. Experimental results on benchmark problems show that the acceleration method is quite effective, especially for instances with a small number of machines and a large number of jobs.

Quay Crane Sequencing Considering Productivity, Interference and Yard Congestion Constraints

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The present paper considers the problem of optimizing the sequencing of quay cranes, which are used at sea port container terminals for the loading and unloading of containers on vessels. The problem formulation takes into consideration realistic circumstances, such as different productivity rates of quay cranes, crane interference, when more than one crane is handling a vessel, clearance constraints, to ensure that a minimum distance between adjacent quay cranes is maintained, as well as yard congestion constraints, to ensure that yard storage areas are not overly accessed. It is formulated as a mixed-integer programming model (MIP) and small instances of the problem are solved using GAMS.

A Multi-Objective Model in the Green Supply Chain Network Désign

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This study considers a green supply chain design (GrSC) with environmental concerns. The aims of the problem are to minimize the total transportation cost and the environment impact, such as CO2 emission. The multi-objective mathematical model is developed for the given problem that captures the trade-off between our objectives. The strategic decisions considered in the model define which warehouses should be selected as a distribution center and what numbers of the vehicles are required to move products among suppliers, distribution center and warehouses.

Development of an EOQ Model for Single Source & Destination, Deteriorating Products Incorporating Price & Freight Discount under Fuzzy Environment

Kanika Gandhi¹, P.C. Jha¹, Yogender Singh¹

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Market globalization and technological penetration increase competition, which encourages independent firms to collaborate in supply chains (SC) to gain mutual benefits. A joint proficiency with synchronization capabilities of the coordination mode is required to assimilate information system and to deal with distribution learning. This development offers more selling opportunities to the retailer of deteriorating products, but also poses new challenges in procurement and distribution SC. Uncertain demand is one of the challenges, while deriving the solution of an economic order quantity (EOQ) inventory model. The current study proposes a fuzzy optimization model to obtain an EOQ while coordinating holding, procurement & transportation of deteriorating products with fuzzy demand, fuzzy holding and total cost. A real life case study is illustrated to validate the model.

Optimal Duration and Control of Promotional Campaign for Durable Technology Product

Sugandha Aggarwal¹, Anshu Gupta¹, Yogender Singh¹, P.C. Jha¹ ¹*University of Delhi, India*

A product can be perceived as a living entity which is brought to life by means of communication done through promotional campaigns. In this paper we develop a mathematical model to determine the optimal duration of promotional campaign carried for promoting new products, maximizing the profit. The developed model makes use of widely used innovation diffusion models to measure the adoption among the product potential segment. The model is solved as an unconstrained optimization. Further a control problem is formulated for case, when the firm wants to capture a higher proportion of potential population within the optimal time frame. We determine the additional amount of promotional resources required to accelerate the promotion and attain the desired sales in the stipulated time. A numerical illustration is shown for the model application.

An Integrated Model for Quay Crane Assignment and Quay Crane Scheduling Problems

Yi-Min Fu¹, Ali Diabat¹, I-Tsung Tsai¹ ¹Masdar Institute of Science and Technology, United Arab Emirates

The Quay Crane Assignment Problem (QCAP) deals with the number of QCs assigned to vessels. The Quay Crane Scheduling Problem (QCSP) consists of scheduling tasks on cranes that are assigned to a vessel. This paper proposes a new approach for integrated QCAP and QCSP. Based on the known berth schedule, the model is able to decide the QC schedule. To be more realistic, the model takes into account QC travel time between bays. Safety margins between QCs and yard congestion are also considered. The problem is formulated as a mixed integer problem (MIP). A small size of instances is then solved using GAMS, followed by a numerical study.

Optimization of the Billet Cutting Operation in the Aluminum Industry: a Case Study

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This paper presents an Operations Research case study in an aluminum production company. The problem under consideration consists of planning the production of billets obtained by cutting long aluminum logs produced in the cast house of the company. The

objective is to minimize the cost of recycling the scrap resulting from the casting and cutting operations. The problem is a special case of the stock cutting problem. Using integer linear programming modeling (ILP), the problem is solved for very large instances. Analysis of the performance of the mathematical model was made through different scenarios and many data sets. The paper shows a real application of OR in industry and presents the first phase of a research project on this problem.

Multi-stage Parallel-machine Job Shop Scheduling with **Due Windows**

Rong-Hwa Huang¹, Chang-Lin Yang¹

¹Fu Jen Catholic University, Taiwan

Job shop is a popular manufacturing environment and is extensively discussed in the literature. Most of the literature focuses on one machine setup at each shop, a configuration that does not occur in real world situations for purposes of workload balancing and makespan shortening. This study thus attempts to minimize total earliness and tardiness costs of a multi-stage parallel-machine job shop scheduling problem with due windows. This study solves this problem using ant colony optimization (ACO). Simulation data testing results show that ACO obtains similar solutions to integer programming when applied to small scale problems, and robust, effective and time-efficient solutions when applied to large scale problems.

A Revised Model for the Static Berth Allocation Problem with Berth Restrictions on Vessel Assignment

Ahmed Simrin¹, Shaikha Al Zaabi¹, Ali Diabat¹

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Different approaches for berth allocation exist in literature. Some of them consider static berth allocation, while other approaches consider dynamic berth allocation. Moreover, approaches differ in the layout used for the quay; discrete, continuous or hybrid. In this paper we propose a new revised model for the Static Berth Allocation Problem with Discrete Berths. Our new model is initially made as a non-linear integer program, but it is then transferred to an integer program. We implemented the model in GAMS and applied different scenarios and then we showed our results and figures.

Evaluation of C4ISR System Effectiveness based on Markov Logic Networks

Ruotong Liao¹, Yanjun Liu¹, Zhong Liu¹, Qian Meng¹, Xunhui Luo¹ ¹National University of Defense Technology, China

In this paper, the ability predicates are set up for the system's functional unit, and influence rules are built for dependent relationship in the system. With the mathematical relationship between ability indexes and weights of predicates, the factors with certain capability, uncertain performance, certain relationships, and uncertain influence in complex system are integrated together. Based on Markov Logic Networks (MLNs) framework, the effectiveness of functional units, subsystems and system are evaluated from functional units' layer, subsystems' layer to the top layer of systems' layer. The evaluation combined the evaluation of static entity's effectiveness and the evaluation reasoning under influence rules. At the end of paper, the evaluation model is examined by experiments and the results indicated some signification of the model.

Evaluation of Project's Alternatives Based on a Multi Criteria Decision Approach

Mohammadhosein Mokhtarani¹, Hamed Shakouri G¹, H Soleimani¹ ¹University of Tehran, Iran

This paper suggests a new approach in order to evaluate alternatives of a project under consideration of quantitative risk analysis. Based on net present value, this paper analyses all alternatives and helps decision makers to assess through the calculation of their evaluation indicators. Under consideration of uncertainty and risk, prediction of project value's parameters is defined by Two-pieces normal distribution. Modifying an efficient algorithm to make a relation between project parameters. Decision maker's risk preference is also studied in this paper based on the cumulative probability distribution.

Aircraft Trip DOC Parameters: A Function of Stage Length, Seat Capacity and Design Range

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In order to directly and quantitatively reflect the intrinsic relationship between aircraft direct operating costs (DOC) and seat capacity and design range, a new DOC calculating model for civil airplanes is presented based on seat capacity, design range and flight length. Firstly, NASA 97 method on 20 specific aircraft types over any

mix of flight lengths is used for generating aircraft DOC samples, which is presented by National Aeronautics and Space Administration of US in 1997. Secondly, the functional form between DOC and flight lengths is determined by the generated samples above, and then the model's coefficient estimations are regressed out. Thirdly, this calculating model's function is presented by analyzing each regression coefficient's variation linked to seat capacity and design range. Fourthly, the ordinary least square (OLS) method is used for estimating the regression function's coefficients. Finally, the paper verifies the feasibility of proposed model.

Stock Characteristics and Transaction Cost in Japanese Stock Market

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In this research, we first examine how closely the transaction cost estimated by the Hasbrouck model is able to capture the bid-ask spread representing the actual transaction cost in the Japanese stock market. Second, we also discuss how the stock characteristics such as the small cap stock effect (the return of the small-cap stock is higher than that of the others) and the value stock effect (the return of the large book-to-market-value stock is larger than the others) influence the level of the transaction cost. Our result indicates that the smaller the market-cap, the larger the bid-ask spread and the larger the book-to-market value, the larger the bid-ask spread and also the former is more salient than the latter. Regarding the estimated transaction cost, the relation with the market-cap is similar to that of the bid-ask spread, whereas that of the estimated transaction cost and the book-to-market-value is not clear.

A Bibliometric Description and Content Analysis of Mega-project Characteristics

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With the rapid development of project management practice, mega-project management has become a hot research topic in the field of project management. At present, researchers hold different understandings of the characteristics of mega-projects, thus it is of theoretical significance to study this issue. By collecting the academic papers relevant to mega-projects published from 1998 to 2011 in the Web of Science, we made a bibliometric description of the retrieval results and summarized the status quo of mega-project management. The content analysis method was employed in this mega-project characteristics study. Using a category system, we found four significant factors including time constraint, stakeholders, impact of external environment, and risk.

Empirical Study on the Relationships Between Leadership and Technology Entrepreneurial Performance

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Regional economies are highly dependent upon entrepreneurial success, but the success rate for entrepreneurs is low. Based on reviewing the leadership theories, this article highlighted leadership key indexes for technology entrepreneurial leadership, analyzed the relationships between technology entrepreneurial leadership and performance, finally found that at this period inventing and relating functions of entrepreneurial leadership played important roles for performance, but visioning and analyzing functions are in lack of attentions. This conclusion pointed out an optimizing orientation for better entrepreneurial performance.

Study and Application on Aided Innovation Design Method Based on Semantic Analysis and TRIZ theory

Zixu Chen¹, Lin Gong¹, Yan Song¹, Guoxin Wang¹
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For the situation that complexity of the design method, high demand of knowledge for the designers in the conceptual design process, and which is difficult to realized, this paper presents the solving process of innovative problems based on the TRIZ theory. Ontology and knowledge database is constructed based on TRIZ. application-oriented knowledge database is constructed, and the description of innovative problems are associated with knowledge. The innovative design method is developed for designers to achieve the relevant knowledge. And the aided innovation system is developed based on semantic analysis technology, which can

automatically recognize the description of the problem. The feasibility and effectiveness of the innovative design method and the aided innovation system is verified through the case of innovative design of the coupling diaphragm component.

The Exploration of Transform Leadership and Organizational Performance --- Two Mediators' Model

Chi-Chuan Wu¹, Fang Chia Hsieh¹, Chien-Wei Ho¹ ¹Tatung University, Taiwan

High-tech industry is a knowledge-intensive industry in Taiwan, so the methods to transfer information and experience to knowledge become more important. Using knowledge to develop innovation and performance also relate to the survival of organizations. However, everyone knows the importance of knowledge and innovation, but plenty of organizations couldn't exploit knowledge to create innovation. This study conducted an empirical research targeted the high-tech industry and explores the relationship of leadership, knowledge sharing, organizational innovation, and organization performance. This study collect data then used SEM to verify hypotheses, and the number of valid questionnaires is 186. This study find that transform leadership would positively affect knowledge sharing, organizational innovation, and organization performance. Also knowledge sharing would positively affect organizational innovation and organization performance. Knowledge sharing as a mediator, transform leadership would affect organizational innovation; however, it wouldn't affect organization performance.

Corporate Citizenship Taking on Social Welfare: Concept Area and Competitive Advantage

Xueying Tian¹
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Great expectations are being placed on corporations to act with increasing social responsibility,

which is adding a new dimension to the role of management and the vision of companies. Meanwhile, society is looking more closely at the impact of business on the public. Thus, the notion of the corporate citizenship is a significant transition in corporate consciousness as organizations look beyond their own definition and experience to see the broader issues. After that we recognize five major areas of social welfare which corporations take part in. Then we establish a model that depicts the relationship between social welfare and competitive advantage, explaining it on the basis of theory analysis. Future research on corporate citizenship would be strengthened in competitive advantages by empirical analysis.

The Establishment of Model for Measuring Interpretation Satisfaction: The Role of Service Quality and Perceived Interpretation Value

Li-Hui Chang¹, Cheng-Shih Lin¹, Tsen-I Kuo¹

¹National Quemoy University, Taiwan

This paper aims to perform causal analysis of the interpretation satisfaction of non-profit organization in Kinmen. A quantitative survey was carried out in order to evaluate the relationship of service quality, perceived interpretation value, satisfaction, and loyalty. It is found that the model fit index is good, for this the battlefield museums in Kinmen need to make its service in line with service expectation and more valuable. By adopting the proposed strategies the tourism sector can increase its customer satisfaction and loyalty.

Socially Responsible Service Operations Management - Trends and Challenges

Hosang Jung¹, Seungbae Sim² ¹Sangmyung University, South Korea

²Yonsei University, South Korea

In this paper, we first proposed the framework of socially responsible service operations management (SRSOM), and then investigated the various related literature on SRSOM using the proposed framework. In line with the current societal trend which emphasizes on the strengthening of the social safety net and the welfare of the people, the SRSOM issues will become more and more important in most of the public and private organizations soon. Although there are huge amounts of interest in socially responsible management and service operations management respectively, there is a lack of trials on combining two different research areas. Thus, we summarize the existing research trials on SRSOM, and suggest future research directions.

A Rapid Optical System for Surface Roughness Measurement of Hard Films

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Zirconium carbon nitride (ZrCN) hard films own lower friction coefficient, high hardness, higher wear and corrosion resistance. A low-cost optical inspection system for rapid surface roughness measurements of ZrCN hard films is developed in this study. The savings in modulation time of photodetector for a new measurement angle is up to 60%. The incident angle of 20° is found to be a good candidate for predicting the surface roughness of ZrCN hard films. Surface roughness of ZrCN hard films can be determined rapidly from the average value of the reflected direct current voltage recorded by the optical system developed. The maximum measurement error rate of the optical measurement system developed is less than 12.37%.

Simulation Study on Quality Risk of Quality Organizational Structure Based on Agent-based Model

Chunhui Yang¹, Tao Hu¹, Zhaohui Luo¹, Lei Yang¹

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Quality risk control is an important part of quality management. The quality risk control of manufacturing chain differs from an enterprise's quality risk control. Moreover, different quality organizational structures achieve different effects of risk control. The quality management structural model is established based on the process of quality formation and the process of information transmission in the manufacturing chain and from the approach of information distortion. On this basis, the effect of quality risk control of three different quality management structures is analyzed, while the simulation analysis on the sensitivity of relevant parameters is carried out, in order to further point out the direction and path for strengthening risk control.

Quality Monitor in Multi-operation Machining Processes based on Wavelet Filtering Bing Chen¹, Pei Wang¹, Dinghua Zhang¹, Kai Liu¹

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The method of quality monitor based on wavelet filtering was proposed to solve the problems of quality control in multi-operation manufacturing processes, whose measurement data contained noise information. The multi-operation machining process quality control model based on the Stream of Variation (SoV) technology was built, which considered the error propagation. Based on this, the method of discrete wavelet transformation was adopted to smooth data and to reduce noise, and then control charts were built by the method of T-square control chart to monitor processes. The average run length (ARL) was adopted to verify the performance of the proposed quality control method. A sample application was developed to illustrate the feasibility and validity of the proposed quality monitor method.

The Joint Impact of Process Ownership and Continuous Process Improvement on Financial Performance and Customer Satisfaction

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There is a remarkable lack of empirical studies investigating the importance of process ownership and continuous process improvement, two dimensions of business process orientation. This study addresses this issue and examines the joint effect of these two concepts on organizational performance. Based on a literature review possible questionnaire items for process ownership, continuous process improvement, financial performance, and customer satisfaction are identified. Data from 840 Austrian manufacturing and service companies are gathered and analyzed. The present empirical results show that firms applying continuous process improvement methods and having process owners in place gain the highest financial performance in relation to the industry average and the highest customer satisfaction compared to competitors.

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CONFERENCE SERVICES & TOURS

CONFERENCE INFORMATION / SERVICES

Secretariat - Meeting Matters International Pte Ltd

E-mail: info@ieem.org

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Emergency Services

Emergency services (police, fire, ambulance) : 999

Police Hotline : (852) 2527 7177 Hong Kong Tourism Board Visitor Hotline : (852) 2508 1234

Telephone Directory Enquiries : 1081 International Services : 10010

Transport Services

Airport Express

The MTR's high-speed Airport Express takes approximately 24 minutes to reach Hong Kong Island. Airport Express passengers are able to take a free shuttle bus from Kowloon and Hong Kong stations to major hotels. Both these stations provide free in-town check-in services for major airlines. Please contact your airline/hotel for further information.

Taxi

Red taxies are (Urban) available throughout most of Hong Kong, except for Tung Chung Road on Lantau Island and the entire south side of Lantau Island. Green taxies operate only on New Territories and Blue Taxies operate only on Lantau Island. All taxis can travel to and from Hong Kong International Airport as well as Hong Kong Disneyland.

Call hotlines for Red taxies (Urban)

Kowloon Taxi Owners Association : (852) 2760 0411
Wai Fat Taxi Owners Association Ltd : (852) 2861 1008
Happy Taxi Operator's Association Ltd : (852) 2728 8282
Pak Kai Taxi Owners Association Ltd : (852) 2728 2281
ABBO Taxi Owners' Association Ltd : (852) 2383 0168

Road Co-op Lost & Found 24 Hours Free Hotline for Lost Property on Taxis Hotline (852) 1872 920

Bus

Bus routes cover almost all of Hong Kong. Kowloon Motor Bus, New World First Bus and Citybus operate routes that cover Hong Kong Island, Kowloon and the New Territories. New Lantao Bus mainly operates on Lantau Island and Long Win Bus provides services to north Lantau Island and the airport. Fares are based on distance travelled and exact change is required if paying by cash. Octopus cards are accepted on all buses in Hong Kong.

CONFERENCE TOURS



Taste of Hong Kong by Night

Monday, 10 Dec 2012 (5:30PM – 9:30PM) USD76/SGD95/HKD530 per person

Price includes: English speaking guide, Peking Duck set dinner (Chinese tea included, other drinks on own expenses), one-way Star Ferry Ride, one-way Open-Top bus ride.

This tour brings you away from the towering skyscrapers of Wanchai to experience the chaos, colour and bright lights of the Kowloon Peninsula. Start off with a scrumptious Peking Duck Dinner at the Peking Garden Restaurant. Originally from the Imperial Courts of Beijing and renowned for its use of the best ingredients, this is an absolute must-try.

Following dinner, we depart to the Former Kowloon-Canton Railway Clock Tower, a declared monument and a landmark from the Age of Steam. Point to remember, don't stray too far from the Waterfront because at 8:00PM, magical display of lights and music unfolds before your eyes. The Symphony of Lights, named the "World's Largest Permanent Light and Sound Show", plays out across Hong Kong's nightscape, and till this day, remains as one of Hong Kong's Must-Sees. Next, hop on to the Open-Top Double Decker Bus and soak in the vibrancy and vitality of Hong Kong by Night. Alight at Temple Street Night Market, one of Hong Kong's biggest and arguably best markets. Famous even amongst the locals, Temple Street boast an astonishing variety of goods, from clothes and electronics to every other knick-knack imaginable. At the end of this tour, delegates may return to their hotels via MTR Yau Ma Tei Station and the MTR Jordan Street Station, both conveniently located near Temple Street Night Market.

*Return expenses are not covered by the tour fee



Full-Day Hong Kong City Tour

Thursday, 13 Dec 2012 (9:00AM - 4:30PM) USD62 / SGD77 / HKD430 per person

Price includes: Coach transfers, English speaking guide, one-way Peak Tram ride, 20-min Sampan ride at Aberdeen Fishing Village, Chinese Dim Sum lunch at local restaurant.

Enjoy the scenic view as the Peak Tram climbs up 1,200 feet to The Peak. The spectacular view of the surrounding city skyline, the world-famous Victoria Harbour and Kowloon, towering skyscrapers and peaceful green hillsides will take your breath away.

Next, we head down to Stanley Market, a popular open-air market, well-known for its bargains buys. Make sure to also visit the Murray House, a 160 year old colonial building restored in 1998. From Stanley, we move on to the Aberdeen Fishing Village. Once an important fishing port in the 19th century, Aberdeen remains as a traditional fishing village and is home to hundreds of fishermen. Hop on a Sampan and gain a deeper insight on the lifestyle of the Hong Kong fishing folk as we ride through the village. No Hong Kong experience is complete without Chinese Dim Sum. One of the great local culinary traditions, Dim Sum literally means "touching your heart" in Chinese. This is one meal you do not want to miss! After lunch, we make a trip down to the Man Mo Temple. Built in 1848, this temple is dedicated to two of the most worshipped gods in ancient China, and is one of the oldest and most well-known temples in the territory. While we're here, pop over to the nearby Hollywood Road and Upper Lascar Row (also known as "Cat Street"). Filled with trinket and antique shops of all sorts, this is the perfect place to pick up unique and eclectic souvenirs. This marks the end of the tour. Delegates may return to HKCEC via coach transfer.



HK Ports Terminal Tour

Thursday, 13 Dec 2012 (9:45AM – 11:30AM) USD20 / SGD25 / HKD150 per person

Price includes: Coach transfer to HIT at 9:45AM, and return transfer to HKCEC at 11:30AM.

Hong Kong International Terminals (HIT) is a member of Hutchison Port Holdings Trust (HPHT), the world's first container port business trust listed in Singapore. HIT is the largest container terminal operator in Hong Kong.

Situated in the Kwai Tsing container port area of Hong Kong, HIT operates twelve berths at Terminals 4, 6, 7 and 9 North and another two through its joint venture with COSCO Pacific Limited at Terminal 8 East. HIT and COSCO-HIT handle over 60 per cent of Kwai Tsing's container port traffic. HIT has continuously set industry benchmarks for productivity and efficiency. With modern management techniques, state-of-the-art computer systems, and award winning IT applications, HIT is a pinnacle of industry excellence.

IN AND AROUND WAN CHAI



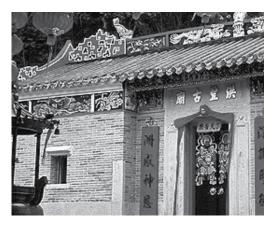


What a trip to Hong Kong without a meal at a local Cha Chaan Teng? Also known as Tea Restaurants, Cha Chaan Tengs serve delicious yet affordable Hong Kong cuisine and Hong Kong-style Western Cuisine. Dine in style at the Starstreet Precinct, a neighbourhood in Wan Chai, comprising of the Star Street, Moon Street, Sun Street, and Wing Fung Street. This area used to be home to Hong Kong Electric's first power plant but is now a fashionable dining neighbourhood with design-driven lifestyle stores.



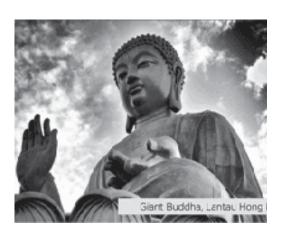
Local Treasure Troves

Wan Chai Computer Centre on Henessay Road is chock full of hardware, software, gadgets and accessories and is a must-visit for all tech-lovers. You'll find a number of excellent rattan and furniture shops dotting the streets along King's Road East. The nearby Spring Garden Lane connects to local wet and dry markets, offering a multicultural experience in the heart of Wan Chai. Do also check out the Tai Yuen Street Market, a strip of shops jam-packed with toys and novelties of all sorts.



Religious Diversity

Hong Kong's temples are active places of worship and the focal point of the city's festivals. Many were built in ancient times and have been carefully preserved as vestiges of Hong Kong's colourful history. The Huang Shing Temple and the Lin Fa Temple were constructed in the 1800s and remain popular amongst locals. The Khalsa Diwan Sikh Temple, Hong Kong's first gurudwara (Sikh temple), survived the World War II and continues to provide religious, social, practical and cohesive support to generations of Sikhs in Hong Kong. The Jamia Mosque is a charming historical building built in the 1840s and has strong cultural significance to Hong Kong's Muslim community.



Beyond Wan Chai

There are so much more to see and do outside Wan Chai. Families will love Disneyland and Ocean Park Hong Kong. The Avenue of Stars and the Tian Tan Buddha are must-go destinations in Hong Kong. Enjoy panoramic views of Hong Kong's cityscape from the Victoria Harbour and the Peak.



In addition to other engineering programmes, SEEM offers a full suite of IEEM programmes from **BEng** to **EngD**.

Department of

Systems Engineering and Engineering Management

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 sequires.

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

SEEM

INDUSTRIAL AND SYSTEMS ENGINEERING AT THE NATIONAL UNIVERSITY OF SINGAPORE



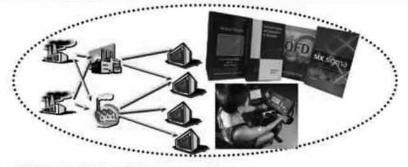
BUILT upon a collection of methodological tools brought together to effect an integrated or total approach to problem-solving in engineering, with productivity and quality improvement as its overall objectives.

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.

PROGRAMS IN SYSTEMS AND ENGINEERING MANAGEMENT DIVISION

Nanyang Technological University, Singapore



he 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: www.ntu.edu.sg/mae.

Systems and Engineering Management includes topics such as Supply Chain and Logistics Management, Design and Operations of Manufacturing Systems, Human Factor Engineering, Quality and Reliability Engineering, Project Management, Design and Management of Service Systems, Mass Customization of Products and Services, etc.

In the SEM Division there are 19 faculty members in the following areas of expertise:

- 1. Systems Engineering and Operations Research
- 2. Design Studies
- 3. Human Factors Engineering
- 4. Quality and Reliability

Corresponding to these interest 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.

Anniversary THE DEPARTMENT OF INDUSTRIAL ENGINEERING AND LOGISTICS MANAGEMENT



TECHNOLOGY for BUSINESS

- The First Logistics Management Program in Hong Kong
- The World Best Leadership & Excellence in the Application and Development of Enterprise-wide Integrated Manufacturing
- The Best Three Logistics Course Providers in Asia (Asian Freight and Supply Chain Management Awards)

Academic Programs

Undergraduate Studies

- Industrial Engineering and Engineering Management (BEng in IEEM)
- Logistics Management and Engineering (BEng in IELM)

Postgraduate Studies

- Doctor of Philosophy (PhD)
- Master of Philosophy (MPhil)
- MSc in Engineering Enterprise Management (MSc-EEM)

香港科技大學
THE HONG KONG
UNIVERSITY OF SCIENCE
AND TECHNOLOGY

University of Macau

http://www.umac.mo (New campus in Hengqin Island will be completed in 2013)



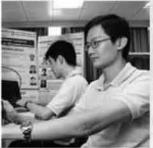
The University of Macau (UM) was founded in 1981 as a private institution by the name of University of East Asia. Through over two decades' development, it has become a leading university in Macao. UM offers around 100 bachelor's, master's and PhD programs with English being the main medium of instruction 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.









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

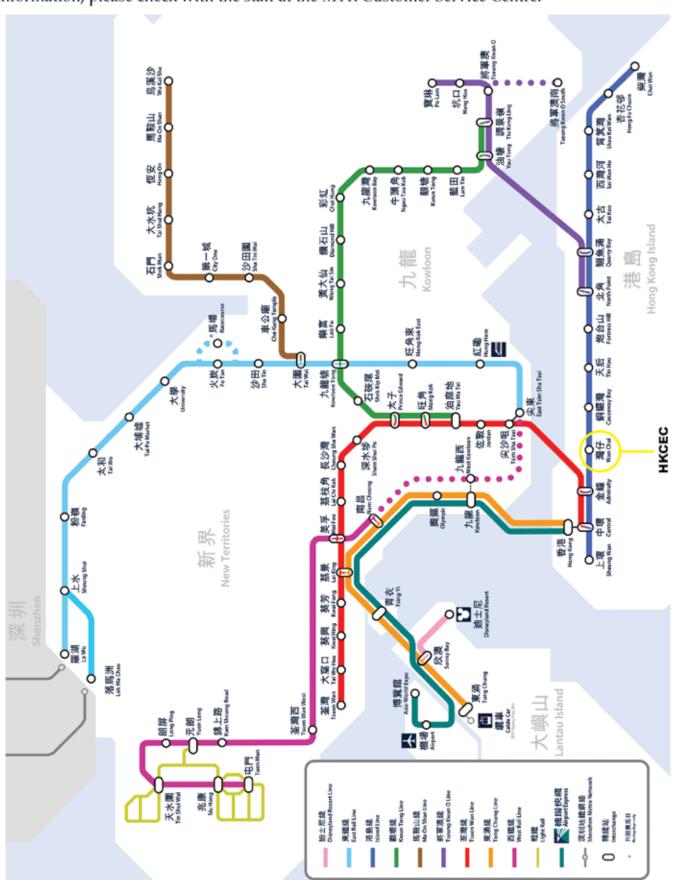
Faculty of Life Science and Healthy (to be developed)





MASS TRANSIT RAILWAY

This covers all major districts in the territory, including stops at the boundary with Mainland China (Lo Wu Station and Lok Ma Chau Station). The MTR consists of ten rail lines, including Island, Tsuen Wan, Kwun Tong, Tseung Kwan O, Tung Chung, West Rail, East Rail, Ma On Shan, Disneyland Resort and the Airport Express. The Airport Express Travel Pass, Tourist Day Pass and Child Tourist Day Pass are available to visitors who are not Hong Kong residents. For more information, please check with the staff at the MTR Customer Service Centre.



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Secretariat

