
CONTENTS

2	Welcome Messages
5	Committees
8	Information & Services
	Venue & Contact
	Floorplan
	Opening & Plenary Sessions
	Meals & Refreshments
	Registration Hours
	Useful Telephone Numbers
	Welcome Reception, Conference Dinner & Closing
13	Program Overview
14	Keynote Presentations
15	Session Schedules
	- 3 Dec 2007
	- 4 Dec 2007
	- 5 Dec 2007
40	Abstracts
106	Author Index

Messages From General Chairs

On behalf of the organizing committee, we are pleased to welcome all participants to the International Conference on Industrial Engineering and Engineering Management (IEEM). We are very pleased with the overwhelming response to the conference and we thank you for your support for and participation in the conference.

As technology progresses over the last couple of centuries, the power of technology no longer lies in its application per se. To add value and to improve competitiveness, technology has to be applied in a manner that creates synergy with people, financial resources, organizations, networks and systems. In other words, there is a need for tools that can create results beyond what traditional engineering theories and practices alone can achieve. Industrial Engineering and Engineering Management fit the bill perfectly. These are areas where technical reasoning, analytical tools, computing power, optimization algorithms, knowledge organization and utilization and so on, when appropriately applied, can bring about advances and even breakthroughs in efficiency and effectiveness in today's increasingly complex operations.



Say Wei FOO
Nanyang Technological University



Thong Ngee GOH
National University of Singapore

Through IEEM conference, we hope to facilitate knowledge creation and diffusion in industrial engineering and engineering management. This year, the IEEE Engineering Management Society Singapore Chapter is very proud to be the organizer of the IEEM conference. The chapter has successfully held many conferences such as the recent IEMC2004 and ICMIT 2006. As a city-state, Singapore has achieved its enviable position today in terms of nation building and industrial research and development without any natural resources but with first-rate engineering schools and management expertise in both public and private sectors. Singapore is an excellent location to showcase what good IEEM can bring about, and for practitioners and researchers from all over the world to get together to discuss the art and science of various aspects of IEEM.

We are very pleased to report that we have received very good response to the conference, the total number of paper submission exceeded 800. In order not to reject many excellent papers, we have made special efforts to include as many technical sessions as possible within the time available.

We are pleased to have Way Kuo and Mike Gregory, to give us the keynote addresses. Other than technical programs, we also make arrangements for you to relax, interact with fellow participants and make new friends.

We wish to take this opportunity to express our gratitude to all the reviewers for their hard work and prompt action in reviewing the few hundreds papers. We are very fortunate to have a good team as the organizing committee, everyone member of the team has done their part with utmost dedication and diligence. We are also thankful to the support given by the National University of Singapore and the Nanyang Technological University and the various sponsors, including the Singapore Tourism Promotion Board.

Last but not least, we wish all our attendees a fruitful conference; and to the participants from overseas, we also wish you an enjoyable and memorable stay in Singapore.

Message From Organizing Committee Chairs

The IEEE International Conference on Industrial Engineering and Engineering Management is being held at the Furama River Front Hotel, Singapore from December 2 through 5, 2007. Recognizing the rapid globalization of our profession and the emerging economies of Asia, the theme of IEEM'2007 is "Connecting Asia with the rest of the world".

This conference was inaugurated in 1994 with the objective of promoting the exchange of ideas and collaboration among industrial engineers and engineering managers in different countries. With the dynamic changes in the industrial engineering and engineering management professions around the world, this conference is geared toward providing a forum to disseminate, to all branches of the service and manufacturing industries, information on the most recent and relevant innovations, theories, and practices in the fields.

In particular, with the rapid industrialization in the Asia Pacific Region, holding the IEEE Industrial Engineering and Engineering Management Conference here in Singapore has much significance. There is a keen interest in this region to acquire knowledge about the theory, application, and practice of our professions. In addition, the region has been playing an increasingly important role in global manufacturing and supply chains. The experience and knowledge we have gained as an active participant in the global economy enhances our understanding of the future directions of the industrial engineering and engineering management professions.

In this conference, we strive to make continuous improvement in the quality and rigor of the papers and presentations. In addition to the regular review of the full papers, we have also invited a number of prominent speakers to make presentations. We would like to take this opportunity to thank these invited speakers.

We will do everything to ensure that your participation at the conference and your stay in Singapore is free of defect. December is an exciting and pleasant period in Singapore. Do take the time to savor our foods and take in our sights. Last but not least, we thank all those involved, including the sub-committees of finance, publicity, logistics, publication, local arrangement, social events, and sponsorship. Without their contribution and dedication, this conference could not have been successful.



Roger JIAO
Nanyang Technological University



Kay Chuan TAN
National University of Singapore

Message From Program Chairs

It is our great pleasure to present to you the Conference Program for IEEE IEEM2007. This is a conference that has attracted an interest far beyond our expectation when the conference was planned. The response has been very overwhelming. We received about 800 full paper submissions from nearly 50 countries/regions by the end of submission deadline, and we had to turn away many requests for late submission and extension of submission deadline.

Despite of the fact that we had many more papers than expected, we managed to arrange a rigorous review of all papers. Each paper was sent to 3-4 referees that include two program committee members and one or two volunteer/author referee. Some additional referees were invited later on to ensure that each paper had at least 2-3 consistent reports. Thanks to all reviewers for their help, the review of all papers submitted to IEEM2007 was completed quickly and final decision was made. All authors were notified ahead of the schedule. We would like to thank all Program/organizing committee members and other author/volunteer reviewers for their hard work and help.

All authors of accepted papers were asked to improve their paper by incorporating the comments from the review reports to make the paper even better. Due to the large number of good papers submitted to our conference, we have to be very selective and the organizing committee has had a hard time in making the final decision. In deed, it was done only after we pursued the other members to accept more papers by increasing the original capacity booked by the conference.

This Conference Program is arranged based on the major topic the paper belongs to and they present the current research and applications in each topic. As the conference has a broad scope, and many topics have inter-disciplinary characteristic, the grouping has been done based on authors' preference. You may find other papers of your interest and all papers are included in the Proceedings.

We hope that this conference provides a useful forum for the exchange of research and experience in the area of general engineering and management for people in Asia and beyond. We hope that all of you find this conference to be inspiring and interesting. Do encourage more people to contribute and participate in IEEM, and help organize one in near future!



Martin Helander
Nanyang Technological University



Min XIE
National University of Singapore

Organizers and Committees

IEEE Engineering Management Society Singapore Chapter
IEEE Singapore Section

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Say Wei FOO, *Nanyang Technological University*
Thong Ngee GOH, *National University of Singapore*

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Kay Chuan TAN, *National University of Singapore*

Program Chairs

Martin HELANDER, *Nanyang Technological University*
Min XIE, *National University of Singapore*

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Publicity: Szu Hui NG, *National University of Singapore*
Logistics: Siong Lin HO, *Ngee Ann Polytechnic*
Publication: Anil VERMA, *Singapore Polytechnic*
Local Arrangement: Kah Hin CHAI, *National University of Singapore*
Social Event: Hung Kei TANG, *Nanyang Technological University*
Sponsorship: Arun KUMAR, *Nanyang Technological University*
Tutorial: Maode MA, *Nanyang Technological University*

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Pekka KESS, *University of Oulu, Finland*

Halimahtun M. KHALID, *Damai Sciences Sdn Bhd, Malaysia*

Tritos LAOSIRIHONGTHONG, *Thammasat University, Thailand*

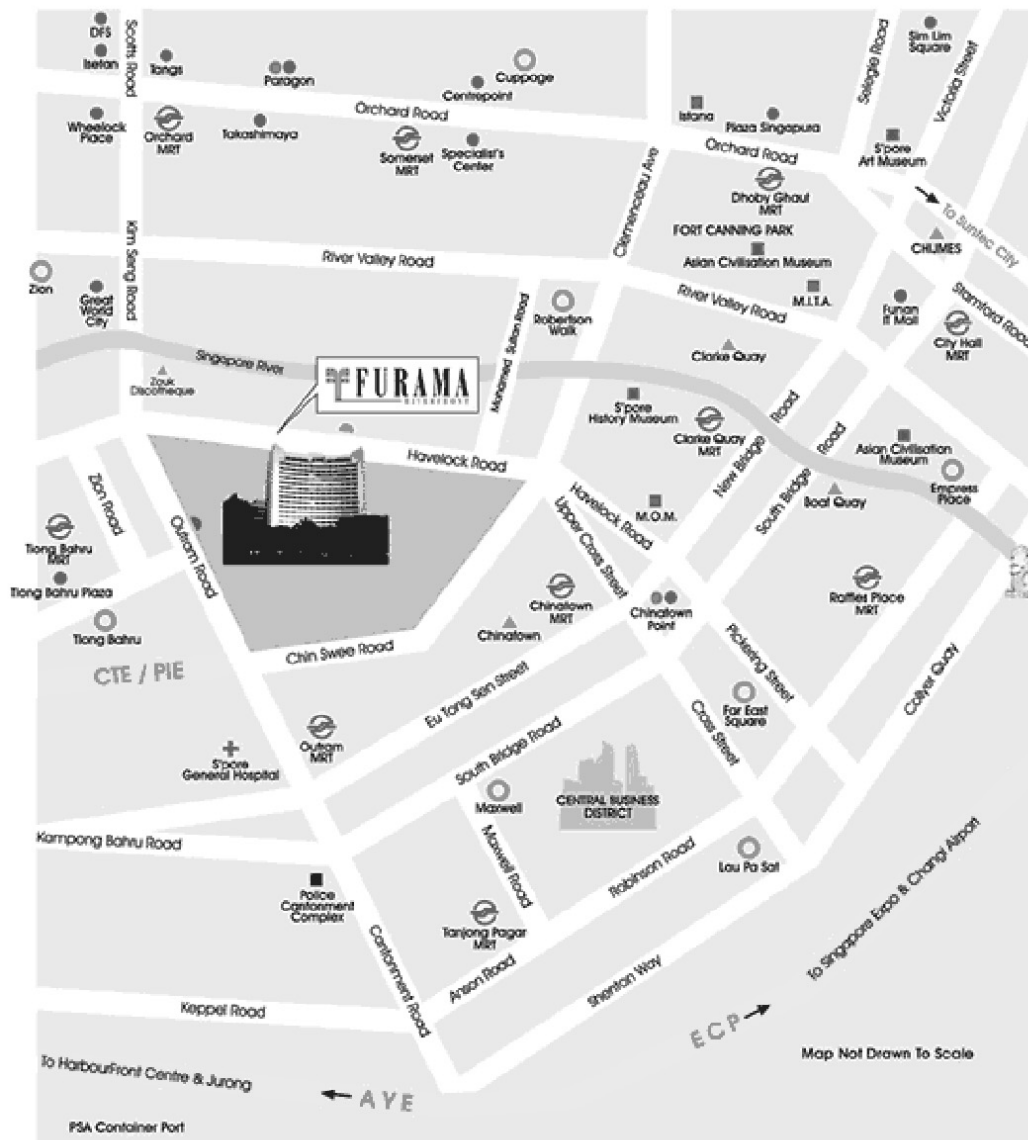
Chi-Guhn LEE, *University of Toronto, Canada*

Loo Hay LEE, *National University of Singapore, Singapore*

Tae-Eog LEE, KAIST, South Korea
 Janny LEUNG, The Chinese University of Hong Kong, Hong Kong
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 Mehmet SAVSAR, Kuwait University, Kuwait
 Rainer SEIDEL, The University of Auckland, New Zealand
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 Jason WOODARD, Singapore Management University, Singapore
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 Myung Hwan YUN, Seoul National University, South Korea
 Zhihai ZHANG, Tsinghua University, China
 Ahmed ZOBAA, Cairo University, Egypt

Information & Services

Visitor Information



Legend

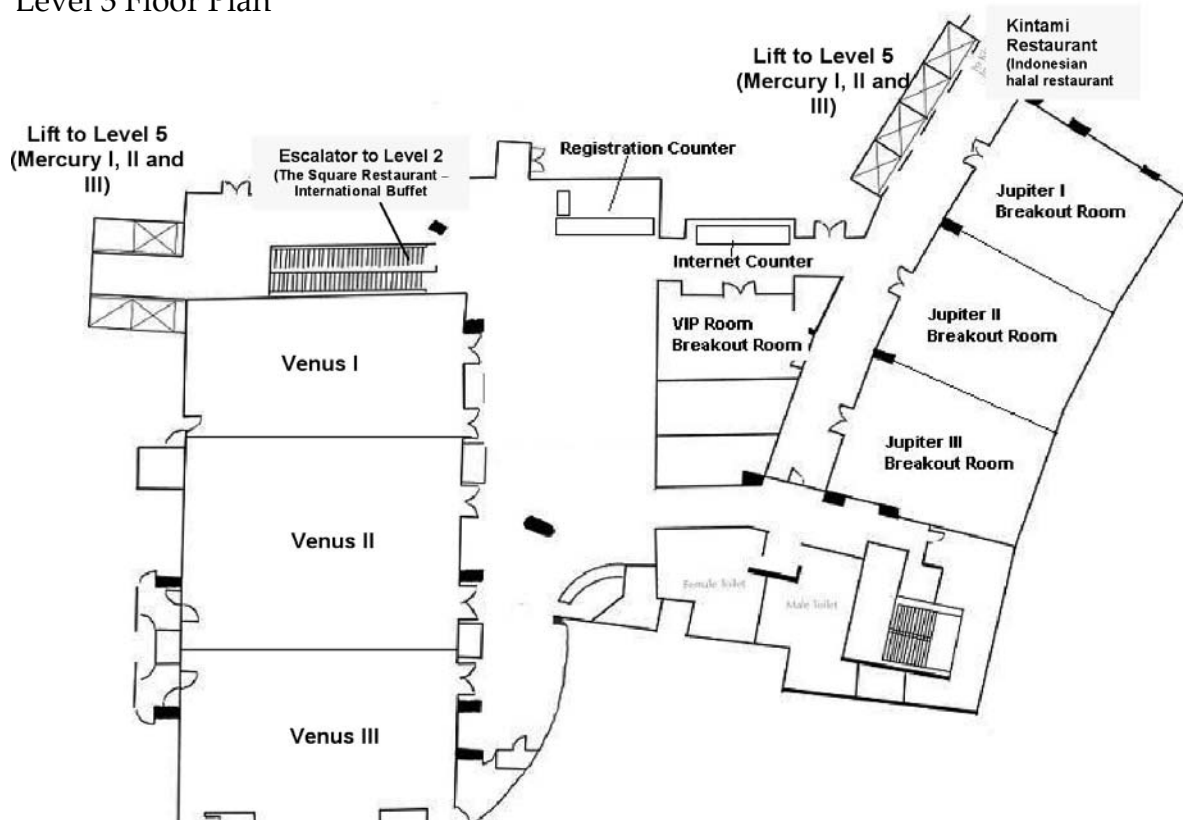
- ▲ Dining & Entertainment ○ Eatery ● Shopping Centre
- Government Office ■ Museum ● MRT Station
- Complimentary Shuttle Bus Drop-off Point
- ▲ Bus No. 51 - Bugis 64, 123 - Orchard Road 608 - Suntec City
- ▲ Bus No. 16, 123, 195 - Tiong Bahru MRT 75 - Outram MRT, Shenton Way 950 - Outram MRT, Chinatown, Shenton Way
- AYE - Ayer Rajah Expressway CTE - Central Expressway ECP - East Coast Parkway Expressway PIE - Pan Island Expressway

Furama Riverfront, Singapore

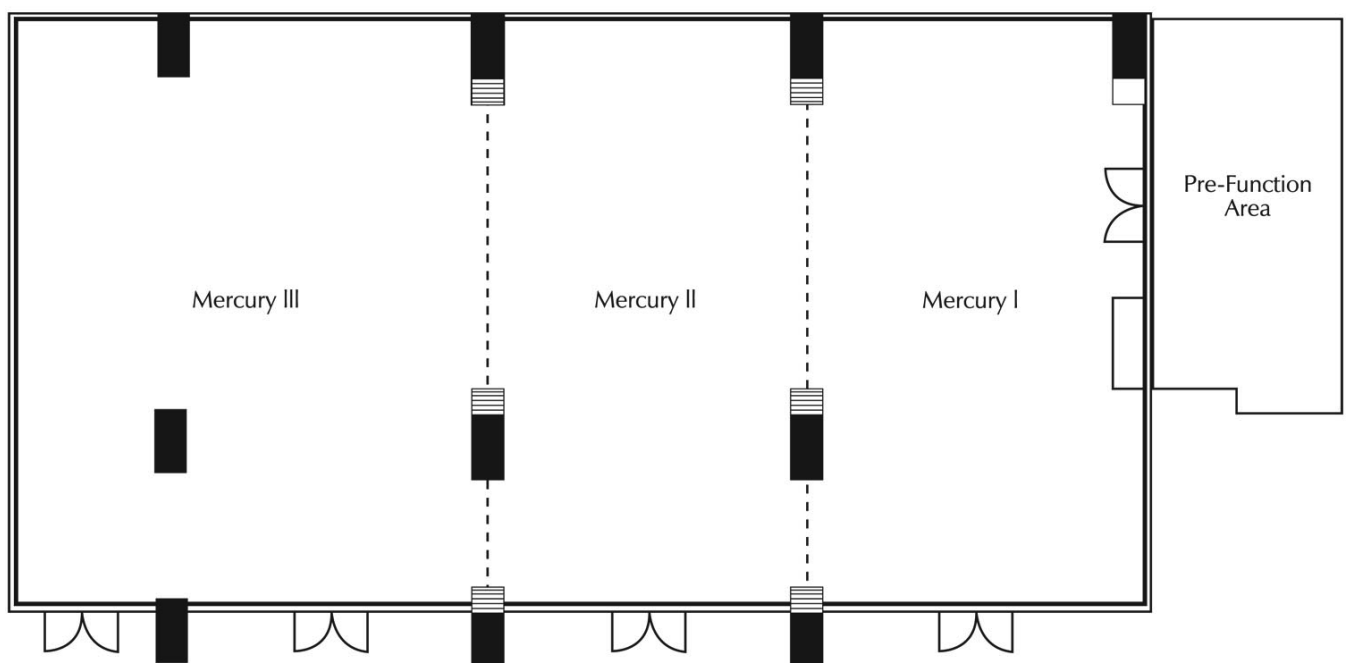
405 Havelock Road
 Singapore 169633
 Main Tel: (65) 6333 8898
 Main Fax: (65) 6733 1588
 Email: riverfront@furama.com

Floor Plan

Level 3 Floor Plan



Level 5 Floor Plan Mercury Room



Opening & Plenary Session

3 December, Monday, 9:00 to 10:30, Venus Ballroom

9:00 to 9:45 Welcom & Opening

9:45 to 10:30

Keynote Address:

Nano Development without Nano Management

Way KUO (*University Distinguished Professor and Dean of Engineering, University of Tennessee, USA*)

Plenary Session

4 December, Tuesday, 9:00 to 10:30, Venus Ballroom

9:00 to 9:45

Keynote Address:

The Globalisation of Manufacturing Implications for Industry Structures and Operations

Mike GREGORY (*Head, Institute for Manufacturing, Cambridge University, UK*)

9:45 to 10:30

Meet-the-editors panel

Meals & Refreshments

Lunch

3 & 4 December, Monday & Tuesday

From 12:30 to 13:30 at

- Foyer, Level 3

- The Square @ Furama, Level 2

- Kintamani Indonesian Restaurant, Level 3

Coffee/Tea Breaks

* 3 & 4 December, Monday & Tuesday

From 10:30 to 11:00 and 15:00 to 15:30 at the Foyer, Level 3 & 5

* 5 December, Wednesday

From 10:30 to 11:00 at the Foyer, Level 3

Registration Hours

Admission to all sessions and hosted function requires identification.

Please wear your name badges at all times.

* 2 December, Sunday

From 14:00 to 17:00 at the Foyer, Level 5

* 3 & 4 December, Monday & Tuesday

From 8:00 to 17:00 at the Foyer, Level 3

Useful Telephone Numbers

Conference Secretariat – Meeting Matters International

Rong Rong, Gwee (Ms), Conference Manager

Tel: (65) 9125 9191 Email: info@ieem2007.org

Furama Riverfront, Singapore

405 Havelock Road Singapore 169633

Tel: (65) 6333 8898 Website: www.furama.com/riverfront/

Emergency

Ambulance: 995

Police: 999

Fire Brigade: 995

About Singapore

Tourist Hotline: 1800 736 2000

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Calling for Cab Services

CitiCab: (65) 6552 2222

SMRT: (65) 6555 8888

Comfort Cablink: (65) 6552 1111

Internet Access

Internet access is available at the Foyer, Level 3.

* 3 & 4 December, Monday & Tuesday

From 8:00 to 17:00

* 5 December, Wednesday

From 8:30 to 12:00

Welcome Reception, Conference Dinner & Closing

Welcome Reception

2 December, Sunday

From 14:30 to 17:00

Furama Riverfront, Mercury II & III, Level 5

Closing

5 December, Wednesday

From 12:30 to 13:30

Furama Riverfront, Venus Ballroom, Level 3

Conference Dinner

4 December, Tuesday

From 19:00 to 22:00

Furama Riverfront, Venus Ballroom, Level 3

Come join us at the conference dinner and enjoy the multi-ethnic performances specially organized for you!

PROGRAM OVERVIEW

Sunday – December 2, 2007

14:00 - 17:00	Delegate Arrival & Welcome Reception
From 17:00	River Boat Tour (Optional – Requires Pre-registration)

Monday – December 3, 2007

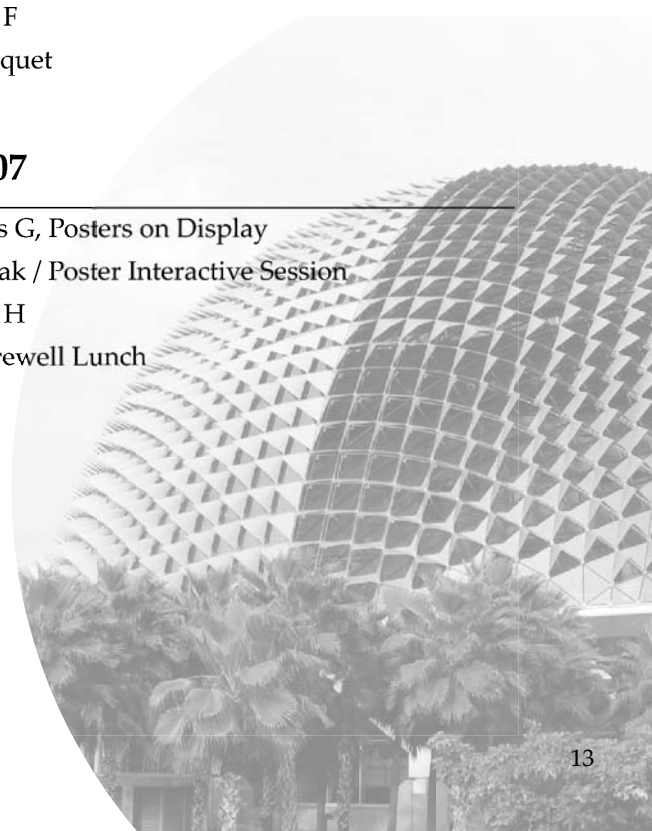
09:00 - 09:45	Welcome & Opening
09:45 - 10:30	Keynote address by Professor Way Kuo
10:30 - 11:00	Coffee / Tea Break
11:00 - 12:30	Parallel Session A
12:30 - 13:30	Lunch Break
13:30 - 15:00	Parallel Session B
15:00 - 15:30	Coffee / Tea Break
15:30 - 17:30	Parallel Session C
From 18:00	Night Safari Tour (Optional – Requires Pre-registration)

Tuesday – December 4, 2007

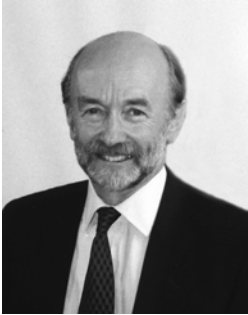
09:00 - 09:45	Keynote address by Professor Mike Gregory
09:45 - 10:30	Meet-the-Editors Panel
10:30 - 11:00	Coffee / Tea Break
11:00 - 12:30	Parallel Session D
12:30 - 13:30	Lunch Break
13:30-15:00	Parallel Session E
15:00 - 15:30	Coffee / Tea Break
15:30 - 17:30	Parallel Session F
19:00 - 22:00	Conference Banquet

Wednesday – December 5, 2007

09:00 - 10:30	Parallel Sessions G, Posters on Display
10:30 - 11:00	Coffee / Tea break / Poster Interactive Session
11:00 - 12:30	Parallel Session H
12:30 - 13:30	Closing and Farewell Lunch



KEYNOTE PRESENTATIONS



The Globalisation of Manufacturing - Implications for Industry Structures and Operations

Professor Mike Gregory
Head of Institute of Manufacturing
Cambridge University, UK

As global industry structures evolve into ever more sophisticated distributed networks companies and governments are faced with increasingly complex strategy and policy decisions. Drawing on a recent review of industrial trends and policies in major economies the presentation will address emerging patterns of design, production and service and the policies which are being developed to address the changing industrial landscape.

Professor Mike Gregory is the Head of the Manufacturing & Management Division and the Institute for Manufacturing at Cambridge University. After an early career in industry he was the founder member of the manufacturing engineering group at Cambridge - the forerunner of the IfM. His research and professional interests include manufacturing strategy, technology management, international manufacturing and industrial policy. He has served on a range of government and institutional committees including the UK National Manufacturing Forum, Executive Committee of ESRC Advanced Institute of Management. He served as Chairman of UK Manufacturing Professors' Forum and Chairman of the General Engineering Panel of the 2001 UK Research Assessment Exercise. Professor Gregory is a Fellow of Churchill College and Fellow of IET.



Nano Development without Nano Management

Professor Way Kuo
University Distinguished Professor and Dean of Engineering
University of Tennessee, USA

Research and development of nano manufacturing is a driving force for strong economic growth in the world, and some analysts predict that its impact will bring about the next industrial revolution. However, very little actual research and development has been conducted by industrial engineers and engineering managers to face the challenges that we are taking in the midst of the nano era. One key reason for this dearth of development is that nano research and development present an interdisciplinary subject that heavily involves new physics phenomena and statistics and industrial engineers are not prepared for the new move. In many ways, the community of IEEM is still taking the strategies of the old paradigm of being efficient and being less technology relevant. All these issues will be addressed in this talk. The talk will start with a historical overview of technologies and the relevance of industrial engineering to the society in the past as well as the future challenges that we face today.

Professor Way Kuo is University Distinguished Professor and Dean of Engineering at The University of Tennessee, and an Honorary Professor of National Chiao Tung University in Taiwan. Previously, he was holder of Wisenbaker Chair of Engineering in Innovation and Executive Associate Dean of Engineering at Texas A&M University and was with Bell Labs and Iowa State University. He is recognized as one of the principal scholars responsible for developing cost-effective methodologies for reducing the infant mortality in the fast-evolving microelectronics industry. Dr. Kuo is an elected member of the US National Academy of Engineering, Academia Sinica (National Academy of Science), Taiwan, and the International Academy for Quality. He is Fellow of IEEE, IIE, INFORMS, ASQ, and also Honorary Professor of Shanghai Jiao Tong University and Xian Jiao Tong University in China.

SESSION SCHEDULES

Monday – December 3, 2007

09:00 to 10:30 – Opening / Keynote Speeches		
Room: Venus Ballroom		
Session A (11:00 – 12:30)	Session B (13:30 – 15:00)	Session C (15:30 – 17:30)
Technology and Knowledge Management (TM-1) <i>Room: Venus I</i>	Technology and Knowledge Management (TM-2) <i>Room: Venus I</i>	Technology and Knowledge Management (TM-3) <i>Room: Venus I</i>
Safety and Security (SS) <i>Room: Venus II</i>	Human Factors (HF-1) <i>Room: Venus II</i>	Human Factors (HF-2) <i>Room: Venus II</i>
Supply Chain Management (SCM-1) <i>Room: Mercury I</i>	Supply Chain Management (SCM-2) <i>Room: Mercury I</i>	Supply Chain Management (SCM-3) <i>Room: Mercury I</i>
Operations Research and Application (OR-1) <i>Room: Mercury II</i>	Operations Research and Application (OR-2) <i>Room: Mercury II</i>	Operations Research and Application (OR-3) <i>Room: Mercury II</i>
Design Analysis and Methods (DA-1) <i>Room: Mercury III</i>	Design Analysis and Methods (DA-2) <i>Room: Mercury III</i>	Design Analysis and Methods (DA-3) <i>Room: Mercury III</i>
E-Business and E-Commerce (EB-1) <i>Room: Jupiter I</i>	E-Business and E-Commerce (EB-2) <i>Room: Jupiter I</i>	Advanced Statistical Process Control (S4) <i>Room: Jupiter I</i>
Project Management (PM-1) <i>Room: Jupiter II</i>	Project Management (PM-2) <i>Room: Jupiter II</i>	Project Management (PM-3) <i>Room: Jupiter II</i>
Global Manufacturing and Management (GM-1) <i>Room: Jupiter III</i>	Global Manufacturing and Management (GM-2) <i>Room: Jupiter III</i>	The CATER System for Vehicle Mass Customization (S1) <i>Room: Jupiter III</i>

EVENING TOURS (OPTIONAL & REQUIRES PRE-REGISTRATION)

Technology and Knowledge Management (1)

Session A (11:00 - 12:30)
Monday - December 3, 2007
Room: Venus I

Chairs: Tritos Laosirihongthong
Kah-Hin Chai

Abstracts: See page 40

- **Disruptive Innovations and the Greying Market**
F. Kohlbacher¹, C C Hang²
¹German Institute for Japanese Studies, Japan
²National University of Singapore, Singapore
- **The Matching between Types of Knowledge and Organizational Learning Styles and the Transformation of the Relationship in the Process from Imitation to Innovation**
Xiao Zhang¹, Fan Feng¹, Jia Li¹
¹Nanjing University, China
- **Networking, Absorptive Capacity, Science Parks ~ A Proposed Conceptual Model for Firm Innovative Performance**
Kai-Ying Chan¹, Tinus Pretorius¹
¹University of Pretoria, South Africa
- **Construction of an Automatic Inspection System with Capability of Identifying Color Characteristics of Product**
Chiao Tzu Huang¹, Ching-Jen Huang¹, Wei-Ling Wang¹
¹National Chin-Yi University of Technology, Taiwan
- **Vertically Integrated Market Structure of Communications Industry and Future Horizontal Market Structure**
Muhammad Khalil Shahid¹, Jie Ren¹, Shoulian Tang¹
¹Beijing University of Posts & Telecommunications, China
- **Vertical Disintegration and Entrepreneurial Opportunities: An Historic Analysis of the Broadcasting Sector**
Jeffrey Funk¹
¹National University of Singapore, Singapore

Technology and Knowledge Management (2)

Session B (13:30 - 15:00)
Monday - December 3, 2007
Room: Venus I

Chairs: Shann-Bin Chang
Kai-Ying Chan

Abstracts: See page 41

- **Selling New Technologies; Making a Convincing Business Case**
Marcel Dissel¹, David Probert¹, Lüder Tokenbürger²
¹University of Cambridge, United Kingdom
²Steinbeis Hochschule Berlin, Germany
- **Knowledge Creation and Diffusion in Innovation Networks by System Viewpoint**
Dian Yan Liou¹, Justin. D. Liou²
¹Yu Da College of Business, Taiwan
²The Pennsylvania State University, United States
- **Service Innovation Efficiency Evaluation on Non-life Insurance Industry in Taiwan**
Chin-Huang Lin¹, Ho-Li Yang², Dian Yan Liou³
¹Chung Hua University, Taiwan
²Chung Hua University, National United University, Taiwan
³Yu Da College of Business, Taiwan
- **Determinants of Job Satisfaction in the IT Industry**
Fethi Calisir¹, Cigdem Altin Gumussoy¹
¹Istanbul Technical University, Turkey
- **An Empirical Investigation of the Knowledge Management Strategic Alignment Model**
Yue-Yang Chen¹, Hui-Ling Huang², Tsai-Pei Liu³
¹I-Shou University, Taiwan
²Shu-Te University, Taiwan
³Kao Fong College, Taiwan
- **Knowledge Management System Architecture for Industry Cluster**
Pradorn Sureephong¹, Nopasit Chakpitak¹, Yacine Ouzrout², Gilles Neubert², Abdelaziz Bouras²
¹Chiang Mai University, Thailand
²University Lumiere Lyon2, France

Technology and Knowledge Management (3)

Session C (15:30 - 17:30)
Monday - December 3, 2007
Room: Venus I

Chairs: Marcel Dissel
Leon Pretorius

Abstracts: See page 42

- **Research on Rapid Design Process Model of Large-scale valve for Product Innovation**
Xiang-dong Li¹, Runhua Tan¹, Lixiao Geng¹, Bojun Yang¹
¹Hebei University of Technology, China
- **Information Seeking Behavior of R&D Professionals in New Product Development**
Bin Guo¹, Haiqiu Li¹
¹Zhejiang University, China
- **Using Modified TAM to Examine the Software Engineers' Attitude on Computer Software Patents**
Shu-Min Chang¹, Shann-Bin Chang²
¹Nan Kai Institute of Technology, Taiwan
²Ling Tung University, Taiwan
- **A Process Model for Application of TRIZ**
Wenyan Zhao¹, Huangao Zhang², Ping Jiang², Runhua Tan²
¹Tianjin University & Hebei University of Technology, China
²Hebei University of Technology, China
- **Factors in Innovative Search Strategy for External Knowledge Sources**
Jun Li¹, Xinmin Peng², Yingbo Zhou¹, Yuan Sun¹, Shuquan Ding¹
¹Zhejiang University, China
²Zhejiang Wanli University, China
- **Modelling the Efficiency of Knowledge Economies in the Asia Pacific: a DEA Approach**
Hui boon Tan¹, Chee Wooi Hooy², Sardar Islam³, Alex Manzoni³
¹Universiti Putra Malaysia, Malaysia
²University of Malaya, Malaysia
³Victoria University, Australia
- **Application-Oriented Technology Valuation: Examples from the Semiconductor Industry**
Chun-Teh Lee¹, Ching-Torng Lin¹
¹Dayeh University, Taiwan
- **Integration of Customer Based Features in Digital Mock-ups**
Heiner Lasi¹, Henning Baars¹, Hans-Georg Kemper¹
¹Universität Stuttgart, Germany

Safety and Security

Session A (11:00 - 12:30)
Monday - December 3, 2007
Room: Venus II

Chairs: Zhizhong Li
Zahid Qureshi

Abstracts: See page 43

- **An Application of the Relevance Matrix Methodology in Occupational Risk Evaluation**
Assed Haddad¹, Daniel DeSouza²
¹Federal University of Rio de Janeiro, Brazil
²North Fluminense State University, Brazil
- **Risk Assessment of Ship Navigation Using Bayesian Learning**
Shenping Hu¹, Cunqiang Cai¹, Quangen Fang¹
¹Shanghai Maritime University, China
- **Modeling Industrial Safety: A Sociotechnical Systems Perspective**
Zahid Qureshi¹, Muhammad Ashraf¹, Yousef Amer¹
¹University of South Australia, Australia
- **The Effect of Competitiveness on Occupational Safety**
Päivi Hämäläinen¹
¹Tampere University of Technology, Finland
- **A Comparative Study of Anti-Phishing Preparedness of Hong Kong and Singapore Banks**
Indranil Bose¹, Alvin Leung¹
¹The University of Hong Kong, Hong Kong
- **RSA-based Secure Electronic Cash Payment System**
Yun Ling¹, Yiming Xiang¹, Xun Wang¹
¹Zhejiang Gongshang University, China

Human Factors (1)

Session B (13:30 - 15:00)
Monday - December 3, 2007
Room: Venus II

Chairs: Bor-Shong Liu
Martin Helander

Abstracts: See page 44

- **The Effect of Feedforward Training to Improve Inspector Performance**
Vanchai Laemlaksakul¹, Sittichai Kaewkuekool²
¹King Mongkut's Institute of Technology North Bangkok, Thailand
²King Mongkut's Institute of Technology Thonburi, Thailand
- **Semi-autonomous Groups Application in Brazil: A Survey-based Approach**
Paulo Eduardo Simonetti¹, Roberto Marx¹
¹University of Sao Paulo, Brazil
- **Construction of Online Game Addiction Based on Player Experience**
Hua Qin¹, P.L. Patrick Rau¹, Hao-qin Zhong¹
¹Tsinghua University, China
- **Study on Structure Dimension of Intellectual Employees' Psychological Contract in Hi-tech Companies in China**
Liyang Wang¹, Jin Chen², Lixin Zhou³
¹Zhejiang University & China Jiliang University, China
²Zhejiang University, China
³Hangzhou Centre of China Quality Certification Centre, China
- **Influence of Control Modes and Complexity on Performance of Manual-control Spacecraft Rendezvous and Docking**
Yijing Zhang¹, Yongzhong Xu², J. Li³, Zhizhong Li¹, Su Wu¹
¹Tsinghua University, China
²China Astronaut Research & Training Center, China
³China Astronaut Research and Training Center, China
- **A Comparative Study of Musical Navigation Methods for Visually Impaired Users of GUI Systems**
Qianyi Zhao¹, Song Xu¹, Zhizhong Li¹, L. Wang¹
¹Tsinghua University, China

Human Factors (2)

Session C (15:30 - 17:30)
Monday - December 3, 2007
Room: Venus II

Chairs: Assed Haddad
Kay Chuan Tan

Abstracts: See page 45

- **Characteristics of Speeders on Freeway Ramps**
Bor-Shong Liu¹, Chien-Hung Lo¹
¹St. John's University, Taiwan
- **Mobile Search: How to Present Search Results for Older Users**
Ronggang Zhou¹, Hitomi Sato², Qin Gao¹, P.L. Patrick Rau¹, Yoko Asano², Kaori Fujimura², Fan Gao¹, Harumi Saito²
¹Tsinghua University, China
²Nippon Telegraph & Telephone Co., Japan
- **A Study Of the Consistence of Subjective Rating for Icon-Background Color Combinations for Small Computer Icons**
Shih-Miao Huang¹
¹National Formosa University, Taiwan
- **A Pilot Measurement of Head-Related Transfer Function Blur in Spatial Localization**
Song Xu¹, Liang Zeng¹, Zhizhong Li¹, Changdong Tian¹, Gavriel Salvendy¹
¹Tsinghua University, China
- **A Study of Morphological Influence on Head-Related Transfer Functions**
Song Xu¹, Zhizhong Li¹, Liang Zeng¹, Gavriel Salvendy¹
¹Tsinghua University, China
- **Road Hazard Reaction Testing Using Driving Simulation: the Novice vs. the Experienced Drivers**
Ying Wang¹, Peng Peng¹, Lijun Liang¹, Wei Zhang¹, Su Wu¹
¹Tsinghua University, China
- **User Perceived Quality of Online Social Information Services: From the Perspective of Knowledge Management**
Yusen Dai¹, Qin Gao¹, Zao Fan¹, Ruogu Kang¹
¹Tsinghua University, China
- **An Empirical Study on the Influencing Factors of Effectiveness of Strategic Decision-Making and Its Relation with Performance Improvement: Evidence from China**
Bei Hu¹, Jiajun Gu¹
¹Huazhong University of Science & Technology, China

Supply Chain Management (1)

Session A (11:00 - 12:30)
Monday - December 3, 2007
Room: Mercury I

Chairs: D.Y. Sha
Tong Shu

Abstracts: See page 46

- **Service Pricing Strategy for Third Party Logistics Corporations Implementing VMI**
Lindu Zhao¹, Lei Tang¹
¹*Southeast University, China*
- **Supply Chain Risk Analysis with Fuzzy Cognitive Maps**
Orhan Feyzioğlu¹, Gulcin Buyukozkan¹, Mehmet Sakir Ersoy¹
¹*Galatasaray University, Turkey*
- **Dynamic Allocation of Inventory in an RFID enabled Transportation Network**
Sandeep Jain¹, Rajesh Kumar²
¹*Hewlett Packard, India*
²*I2 Technologies, India*
- **Selection Model and N-tier Expansion of Collaborative Credit-granting Guaranty Approaches on the Basis of AVE**
Tong Shu¹, Shou Chen¹, Bart McCarthy², Luc Muyldermans², Kin Keung Lai³, Shouyang Wang⁴
¹*Human University, China*
²*University of Nottingham, United Kingdom*
³*City University of Hong Kong, Hong Kong*
⁴*Chinese Academy of Sciences, China*
- **Supplier Selection Using Rough Set Theory**
Betty Chang¹, Hsu-Feng Hung², Chih-Chung Lo³
¹*National Chen-Chi University, Taiwan*
²*National Ilan University, Taiwan*
³*Fo Guang University, Taiwan*
- **A Hybrid Fuzzy Clustering PSO Algorithm for a Clustering Supplier Problem**
Esmaeil Mehdizadeh¹, Reza Tavakkoli-Moghaddam²
¹*Islamic Azad University, Qazvin Branch, Iran*
²*University of Tehran, Iran*

Supply Chain Management (2)

Session B (13:30 - 15:00)
Monday - December 3, 2007
Room: Mercury I

Chairs: Noor Hasnah Moin
Christoph Schwindt

Abstracts: See page 47

- **Supply Chain Grounded on Information Theory: A Hierarchical Economic Information Filtering Model of Supplier Selection**
Tong Shu¹, Shou Chen¹, Bart McCarthy², Luc Muyldermans², Kin Keung Lai³, Shouyang Wang⁴
¹*Human University, China*
²*University of Nottingham, United Kingdom*
³*City University of Hong Kong, Hong Kong*
⁴*Chinese Academy of Sciences, China*
- **Supply Chain Grounded on Information Theory: Criterion Weighting and Its Explication of A Hierarchical Economic Information Filtering Model of Supplier Selection**
Tong Shu¹, Shou Chen¹, Bart McCarthy², Luc Muyldermans², Kin Keung Lai³, Shouyang Wang⁴
¹*Human University, China*
²*University of Nottingham, United Kingdom*
³*City University of Hong Kong, Hong Kong*
⁴*Chinese Academy of Sciences, China*
- **A Simulation and Prediction Model to enhance e-Service Sharing and SCM Market Competition**
Johannes K. Chiang¹, Kiekang Chao¹
¹*MIS, National Chengchi University, Taiwan*
- **Alignment Strategies of AMT with E-Commerce Setting to Improve Business Strategy in the Supply Chain Operations Environment - An Empirical Study**
D.Y. Sha¹, P.K. Chen², Yung-Hsin Chen³
¹*Chung Hua University, Taiwan*
²*National Chiao Tung University, Taiwan*
³*Asia University, Taiwan*
- **Sourcing from China – The Challenges of Swiss Companies**
Josef Oehmen¹, Robert Alard¹, Philipp Bremen¹
¹*ETH Zurich, Switzerland*
- **Can Learning Intelligence Outperforms Information Sharing in Supply Chain Performances - An Order Arrival Prediction Perspective**
Kune-muh Tsai¹, Feng-Chin Chou², Wen-chen Chen¹
¹*National Kaohsiung First University of Science & Technology, Taiwan*
²*Wu Feng Institute of Technology, Taiwan*

Supply Chain Management (3)

Session C (15:30 - 17:30)
Monday - December 3, 2007
Room: Mercury I

Chairs: Ching-Jung Ting
Young Park

Abstracts: See page 48

- **Minimum Cost Delivery Problem in Intermodal Transportation Networks**
Haiqing Song¹, Gongyu Chen²
¹*National University of Singapore, Singapore*
²*Sun Yat-Sen University, China*
- **Simulation of Order Scheduling under Hybrid Order Fulfillment Strategy**
Uwe Clausen¹, Ling Zhou¹, Sandeep B. Khot¹, Bernhard Heimann¹
¹*Dortmund University, Germany*
- **Selection of Potential 3PL Services Providers Using TOPSIS with Interval Data**
M.N. Qureshi¹, Dinesh Kumar¹, Pradeep Kumar¹
¹*Indian Institute of Technology, India*
- **Implementing Design for Six Sigma for Supply Chain Design**
Yousef Amer¹, Lee Luong¹, Sang-Heon Lee¹, William Y C Wang¹, Muhammad Ashraf¹, Zahid Qureshi¹
¹*University of South Australia, Australia*
- **Research on the Problem of Deteriorating Items Multi-warehouse**
Qing Tian¹, Sheng-lu Zhang¹
¹*Harbin Institute of Technology Shenzhen Graduate School, China*
- **Employing Genetic Algorithms to Minimise the Bullwhip Effect in a Supply Chain**
Jianping Lu¹, Paul Humphreys¹, Ronan McIvor¹, Liam Maguire¹
¹*University of Ulster, United Kingdom*
- **Trust Evaluation Model for Fractal-based Virtual Enterprises Using Goal Achievement Probability**
Jungtae Mun¹, Moonsoo Shin¹, Kyunghuy Lee², Mooyoung Jung¹
¹*POSTECH, South Korea*
²*Daejeon University, South Korea*
- **A Fuzzy Association Rules Mining Approach for Modeling Agility in Supply Chains**
Vipul Jain¹, Lyes Benyoucef¹
¹*INRIA-France, France*

Operations Research and Application (1)

Session A (11:00 - 12:30)
Monday - December 3, 2007
Room: Mercury II

Chairs: Huifen Chen
Seok Ho Chang

Abstracts: See page 49

- **Sensitivity of Manufacturer and Buyer's Risks for Lifetime Warranty Policies**
Anisur Rahman¹, Gopinath Chattopadhyay²
¹Griffith University, Australia
²Central Queensland University, Australia
- **Incorporating Probabilistic Fuzzy Sets into the Newsvendor Model with Hybrid Data**
Huei-Fu Lu¹
¹Aletheia University, Taiwan
- **Analysis of an Unreliable Batch Machine and a Finite Buffer Fed by an Unreliable Single-Item Machine: Partial Batches**
Seok Ho Chang¹, Stanley Gershwin²
¹Nanyang Technological University, Singapore
²Massachusetts Institute of Technology, United States
- **A Robust Optimization Model for BTO Manufacturing Revenue Management**
Li Li¹, Rongqiu Chen¹, Xiang Zhang², Xiangzhi Bu¹
¹Huazhong University of Science & Technology, China
²Beijing Institute of Technology, China
- **Disjunctive and Time-indexed Formulations for Non-preemptive Job Shop Scheduling with Resource Availability Constraints**
Sadia Azem¹, Riad Aggoune², Stephane Dauzere-Peres³
¹ENSM Saint-Etienne, Luxembourg University, France
²Luxembourg University, Luxembourg
³ENSM Saint-Etienne, France
- **Design Considerations of Terrestrial Communications System**
Young C. Park¹
¹Baekseok University, South Korea

Operations Research and Application (2)

Session B (13:30 - 15:00)
Monday - December 3, 2007
Room: Mercury II

Chairs: Gopinath Chattopadhyay
Huei-Fu Lu

Abstracts: See page 50

- **A Numerical Method for Solving a Class of Continuous-time Linear Programming Problems**
Ching-Feng Wen¹, Yung-Yih Lur²
¹Kaohsiung Medical University, Taiwan
²Vanung University, Taiwan
- **A Model of Placing a Liaison in the Same Level of a Pyramid Organization Structure**
Kiyoshi Sawada¹
¹University of Marketing & Distribution Sciences, Japan
- **Investigation on the short-term variations of Electricity Demand due to the Climate Changes via a Hybrid TSK-FR Model**
Hamed Shakouri G.¹, Reza Nadimi¹
¹University of Tehran, Iran
- **Implementation of Particle Swarm Optimization in Construction of Optimal Risky Portfolios**
Mohammad Ali Dashti¹, Yaghob Farjami¹, Ahmad Vedadi¹, Mohammad Anisesh²
¹Islamic Azad University, Iran
²University Electrical & Computer Research Center, Iran
- **Critical Routes Determination for Emergency Transportation Network aftermath Earthquake**
Afshin Shariat Mohaymany¹, Nasim Pirnazar¹
¹Iran University of Science & Technology, Iran
- **Modeling of Energy Efficiency Indicator for Semiconductor Industry**
Li-Ming Wu¹, Bai-Sheng Chen²
¹Ching Yun University, Taiwan
²Takming University of Science & Technology, Taiwan

Operations Research and Application (3)

Session C (15:30 - 17:30)
Monday - December 3, 2007
Room: Mercury II

Chairs: Stein W. Wallace
Hamed Shakouri G.

Abstracts: See page 51

- **A Common Weighted Performance Evaluation Process by Using Data Envelopment Analysis Models**
Ching-Hsiang Lai¹, Meng-Ying Wei¹
¹Chung Shan Medical University, Taiwan
- **Optimization of Fuzzy Relational Equations with a Linear Convex Combination of Max-min and Max-average Compositions**
Yan-Kuen Wu¹, Wen-Wei Yang²
¹Vanung University, Taiwan
- **Multi-response Grinding Process Functional Approximation and Its Influence on Solution Quality of a Modified Tabu Search**
Indrajit Mukherjee¹, Pradip Kumar Ray²
¹Bengal Engineering & Science University, Shibpur, India
²Indian Institute of Technology Kharagpur, India
- **Modified Value Iteration for Chemotherapy Scheduling Optimization**
Yifan Liu¹, Hui Jiang², Zheng Su³
¹George Mason University, United States
²Stanford University, United States
³State University of New York at Stonybrook, United States
- **360 Degree Personnel Performance Appraisal Using the MADM Models and Presenting a Model for overall Ranking**
Mohammad Anisesh¹, Javad Dodangeh², Fatemeh Piri³, Mohammad Ali Dashti²
¹University Electrical & Computer Research Center, Iran
²Islamic Azad University, Iran
³Azad University, Karaj Branch, Iran
- **Study on Plan of Track Lines in Marshalling Station**
Shidong Wang¹, Li Zheng¹, Zhihai Zhang¹
¹Tsinghua University, China
- **A Decision Support System for the Reserve Bank of India to Forecast Currency requirements at Currency Chests**
Chandra Sunil Kumar Ch.S.N.¹, Narendran T.T.¹
¹Indian Institute of Technology Madras, India
- **Artificial Immune Systems for Intelligent Nurse Rostering**
Chih-Chung Lo¹, Chih-Chang Lin¹, Cheng-Tzu Wang², Ting-Jung Dai³, Dominic Wong¹
¹Fo Guang University, Taiwan
²National Taipei University of Education, Taiwan
³Hong Cheng International Technology Inc., Taiwan

Decision Analysis and Methods (1)

Session A (11:00 - 12:30)
Monday - December 3, 2007
Room: Mercury III

Chairs: Ming-Lang Tseng
Miaoling Wang

Abstracts: See page 52

- **A Class of Fuzzy Rough Inventory Model and Its Application**
Lihui Zhao¹, Jiuping Xu¹
¹*Sichuan University, China*
- **Applying SVM to Build Supplier Evaluation Model - Comparing Likert Scale and Fuzzy Scale**
Chun F. Hsu¹, Betty Chang², Hsu-Feng Hung³
¹*National Taiwan University, Taiwan*
²*National Chen-Chi University, Taiwan*
³*National Ilan University, Taiwan*
- **A Class of Facility Location Model and Its Application**
Yuan Zhang¹, Jiuping Xu¹
¹*Sichuan University, China*
- **Dynamic Stochastic Programming for Asset Allocation Problem**
Haiqing Song¹, Huei-Chuen Huang²
¹*National University of Singapore, Singapore*
²*Sun Yat-Sen University, China*
- **ERP Sandtable Simulation Evaluation Based on ANP**
Ran Bi¹, Jinyu Wei¹, Rui Chen¹
¹*Tianjin University of Technology, China*
- **An Integrated Theory-Of-Constraints**
Amitava Ray¹, Bijan Sarkar¹, Subir Sanyal¹
¹*Jadavpur University, India*

Decision Analysis and Methods (2)

Session B (13:30 - 15:00)
Monday - December 3, 2007
Room: Mercury III

Chairs: Ikou Kaku
Haiqing Song

Abstracts: See page 53

- **A HMM Based Method for Selecting the Solution of Function Module**
Xiansheng Qin¹, Wendan Wang¹, Xiutian Yan², Jing Bai¹, Shurong Tong¹
¹*Northwestern Polytechnical University, China*
²*University of Strathclyde, United Kingdom*
- **Research on FTOPSIS Model of Threat Synthetic Evaluation in Multi-target Tracing System**
Baihe Wang¹, Jianguo Huang¹, Xiansheng Qin¹, Zhenhua Yan¹, Jing Bai¹
¹*Northwestern Polytechnical University, China*
- **Modeling and Deriving Strategic Logistic Measures**
Felix Wriggers¹, Tim Busse¹, Peter Nyhuis¹
¹*Leibniz Universitaet Hannover, Germany*
- **A Multiplicative Optimization Model for Constructing Composite Indicators**
Peng Zhou¹, Beng Wah Ang¹, Kim Leng Poh¹, Liwei Fan¹
¹*National University of Singapore, Singapore*
- **Modeling Software Integration Scenarios for Telecommunications Operations Software Vendors**
Oleksiy Mazhelis¹, Pasi Tyrvaenen¹, Erkki Viitala²
¹*University of Jyväskylä, Finland*
²*Comptel Oyj, Finland*
- **An AHP/DEA Hybrid Model for Measuring the Relative Efficiency of Energy Efficiency Technologies**
Seongkon Lee¹, Gento Mogi², Sungchul Shin¹, Jongwook Kim¹
¹*Korea Institute of Energy Research, South Korea*
²*The University of Tokyo, Japan*

Decision Analysis and Methods (3)

Session C (15:30 - 17:30)
Monday - December 3, 2007
Room: Mercury III

Chairs: Jiuping Xu
Felix Wriggers

Abstracts: See page 54

- **Developing a Systematic Method for Constructing the Function Platform of Product Family**
Wendan Wang¹, Xiansheng Qin¹, Xiutian Yan², Shurong Tong¹, Quanyou Sha¹
¹*Northwestern Polytechnical University, China*
²*University of Strathclyde, United Kingdom*
- **Optimal Pricing Strategies for Green Products Based on Win-Win Concept**
Miaoling Wang¹
¹*Ming-Hsin University of Science & Technology, Taiwan*
- **A Fuzzy Approach for Multilevel Multiobjective Programming Problems and the Concept of Generalized Lambda-Extreme Points**
Hitoshi Yano¹
¹*Nagoya City University, Japan*
- **Technology Assessment as Guidance to Business Management of New Technologies**
Mei-Chen Lo¹, Jerzy Michnik², Li-Ping Cheng³
¹*National United University, Taiwan*
²*The K. Adamiecki University of Economics in Katowice, Poland*
³*Hung-Hwa Institution for Economic Research, Taiwan*
- **Financial Characteristics and Prediction on Targets of M&A Based on SOM-Hopfield Neural Network**
Hongjiu Liu¹, Huimin Chen¹, Yanrong Hu¹
¹*Changshu Institute of Technology, China*
- **A Scheduling-specific Modeling Approach for Real World Scheduling**
Jacomine Grobler¹, Andries P. Engelbrecht¹
¹*University of Pretoria, South Africa*
- **Fuzzy DEA Model Based on Cloud Theory**
Wu Liao¹, Yun xiang Chen¹, Kun Li¹
¹*Air Force Engineering University, China*
- **Applying the Real Options Approach to an Optimal Multi-stage Acquisition Model**
Tyrone T. Lin¹, Chie Bein Chen², Chin-Tsai Lin³, Te-Hsien Liu¹
¹*National Dong Hwa University, Taiwan*
²*Takming College, Taiwan*
³*Yuanpei University, Taiwan*

E-Business and E-Commerce (1)

Session A (11:00 - 12:30)
Monday - December 3, 2007
Room: Jupiter I

Chairs: Indranil Bose
Wan Mei Soon

Abstracts: See page 55

- **An Intelligent Agent-based Collaborative Workflow for Inter-enterprise PCB Product Design**
Ching-Jen Huang¹, Li-Man Liao¹
¹National Chin-Yi University of Technology, Taiwan
- **Does Business Format Matter? Performance Measurement and Internet Retail Format**
G. Gunawan¹
¹University of Surabaya, Indonesia
- **Using UTAUT to Explore the Behavior of 3G Mobile Communication Users**
Yu-Lung Wu¹, Yu-Hui Tao², Pei-Chi Yang³
¹I-Shou University, Taiwan
²National University of Kaohsiung, Taiwan
³I-shou University, Taiwan
- **Investigating Customers' Decision to Accept E-banking Services**
Mostafa Mesgari Mashhadi¹, Maryam Tofighi², Vahid Salamat³
¹Member of Young Researchers Club (Islamic Azad University), Iran
²Shahid Beheshti University, Iran
³University of Greenwich, United Kingdom
- **A Study of Collaborative Product Commerce by Co-citation Analysis and Social Network Analysis**
Chyan Yang¹, Szu-Hui Wu¹, Joahanna Lee¹
¹National Chiao Tung University, Taiwan

E-Business and E-Commerce (2)

Session B (13:30 - 15:00)
Monday - December 3, 2007
Room: Jupiter I

Chairs: Virgilio Cruz-Machado
G. Gunawan

Abstracts: See page 56

- **Stochastic Management for Randomly Broken Multi-channel Servers for E-commerce Applications**
Song-Kyoo Kim¹
¹Samsung Electronics Co., Ltd, South Korea
- **HPRS: A Profitability Based Recommender System**
Mu-Chen Chen¹, Long-Sheng Chen², Fei-Hao Hsu³, Yuanjia Hsu⁴, Hsiao-Ying Chou³
¹National Chiao Tung University, Taiwan
²Chaoyang University of Technology, Taiwan
³National Taipei University of Technology, Taiwan
⁴High Tech Computer Corp., Taiwan
- **An Empirical Study on Influencing Factors of Enterprise Recruiter's Conditional Brand Choice of E-recruiting Provider**
Yuan Sun¹, Hsin-Chuan Chou¹, Xinmin Peng², Guilin Guo¹, Fangwen Zhu³, Kai Wang¹, Ying Zhang¹
¹Zhejiang University, China
²Zhejiang Wanli University, China
³Fudan University, China
- **Recent Development of Recommender Systems**
Cheng-Ting Wu¹, Hsiao-Fan Wang¹
¹National Tsing Hua University, Taiwan
- **Consumers' Perceptions of Uncertainty and Risk Factors Related to Electronic Insurance Services**
Sanna Nenonen¹, Jouni Kivistö-Rahasto¹
¹Tampere University of Technology, Finland

Advanced Statistical Process Control

Session C (15:30 - 17:30)
Monday - December 3, 2007
Room: Jupiter I

Chairs: Philippe Castagliola
Zhang Wu

Abstracts: See page 57

- **A Model-Free Design of Xbar Charts for Unknown Autocorrelated Processes**
Yuyen Cheng¹, Huifen Chen¹
¹Chung-Yuan University, Taiwan
- **Comparisons of the Symmetric and Asymmetric Control Limits for Xbar Charts**
Huifen Chen¹, Wei-Lun Kuo¹
¹Chung-Yuan University, Taiwan
- **Can a Variable Be Monitored by an np Chart Effectively?**
Zhang Wu¹
¹Nanyang Technological University, Singapore
- **The Efficiency of the EWMA Capability Chart**
Philippe Castagliola¹, Kerstin Vannman²
¹IRCCyN UMR CNRS 6597 & Université de Nantes, France
²Lulea University of Technology, Sweden
- **The Average Run Length of Shewhart Style Control Chart under Normal Fuzzy Random Environments with Trapezoidal Membership Function**
Sayi Thoutou¹, Renkuan Guo¹, Chun-Yuan Cheng², Tim Dunne¹
¹University of Cape Town, South Africa
²Chaoyang University of Technology, Taiwan
- **The Effect of Measurement Error on the Performance of the CUSUM Control Chart**
Petros Maravelakis¹
¹University of the Aegean, Greece
- **The EWMAST Control Charts with Estimated Limits: Properties and Recommendations**
Giovanna Capizzi¹, Guido Masarotto¹
¹University of Padua, Italy
- **Economic Design of Integrated Time-Between-Events Chart System with Independent Quality Characteristics**
Haiyun Zhang¹, Min Xie¹, Thong Ngee Goh¹, Mohammad Shamsuzzaman¹
¹National University of Singapore, Singapore

Project Management (1)

Session A (11:00 - 12:30)
Monday - December 3, 2007
Room: Jupiter II

Chairs: Yongyi Shou
Amnon Gonen

Abstracts: See page 58

- **An Approach for Testing the Feasibility of Decomposing Interdependent Design Tasks for Concurrent Engineering**
Hamdi Bashir¹, Khalid AlZebdeh¹, Jamil Abdo¹
¹Sultan Qaboos University, Oman
- **Using Robust Portfolio Modeling for Selecting of New Product Development Projects - A Case Study**
Adel Feyz¹, Hossein Iranmanesh²
¹University of Tehran, Iran
²University of Tehran, Institute for Trade Studies & Research, Iran
- **The Assessment of Bidding Strategy of Iranian Construction Firm**
Behzad Esmaeeli¹, Mehdi Ravanshadnia¹, Mohammad Taghi Banki¹
¹Amirkabir University, Iran
- **Estimating Design Effort in Product Development: A Case Study at Pratt & Whitney Canada**
Adil Salam¹, Nadia Bhuiyan¹, Gerard Gouw¹, Syed Asif Raza²
¹Concordia University, Canada
²CRT, University of Montreal, Canada
- **Differing Roles of Axiomatic Design and Design Structure Matrix in Reducing System Complexity**
Yee Soon Lim¹
¹Nanyang Technological University, Singapore

Project Management (2)

Session B (13:30 - 15:00)
Monday - December 3, 2007
Room: Jupiter II

Chairs: Hamdi Bashir
Hongbo Wang

Abstracts: See page 59

- **Developing a New Structure for Determining Time Risk Priority using Risk Breakdown Matrix in EPC Projects**
Hossein Iranmanesh¹, Monire Jalili², Zhila Pirmoradi³
¹University of Tehran, Institute for Trade Studies & Research, Iran
²Mapna University of Tehran, Iran
³University of Tehran, Iran
- **A Team Building Approach for Competency Development**
Onanong Hlaottitun¹, Eric Bonjour¹, Maryvonne Dulmet¹
¹Université de Franche-Comté, Besançon, France
- **A Preliminary Study of Meeting Flow Management for Software Project Development: the Prototype (MfPMIS)**
Chung-Yang Chen¹, Keng-Hui Chao², Pei-Chi Chen³
¹National Central University, Taiwan
²Chang Gung University, Taiwan
³Trend Micro Incorporated, Taiwan
- **A New Formula to "Estimate at Completion" of a Project's Time to Improve "Earned Value Management System"**
Hossein Iranmanesh¹, Navid Mojir², Salman Kimiagari²
¹University of Tehran, Institute for Trade Studies & Research, Iran
²University of Tehran, Iran
- **Planning with Uncertainties for a Heritage Building Restoration Project in Calcutta, India**
Shion Guha¹
¹Jadavpur University, India
- **An Interpretive Structural Model for Project Planning and Success**
Parveen Farooque¹, Javed Khan¹
¹Aligarh Muslim University, India

Project Management (3)

Session C (15:30 - 17:30)
Monday - December 3, 2007
Room: Jupiter II

Chairs: Chung-Yang Chen
Jia Da Tang

Abstracts: See page 60

- **A Bi-directional Ant Colony Algorithm for Resource Constrained Project Scheduling**
Yongyi Shou¹
¹Zhejiang University, China
- **Estimating Project Completion Times - Simulation and Analytic Approach**
Amnon Gonen¹
¹Holon Institute of Technology, Israel
- **A New Approach for Buffer Sizing in Critical Chain Scheduling**
Behzad Ashtiani¹, Gholam reza Jalali¹, M.Bahador Aryanezhad¹, Ahmad Makui¹
¹Iran University of Science & Technology, Iran
- **Development Projects Scheduling and Design Structure Matrix**
Yan-Jun Qian¹, Thong Ngee Goh¹
¹National University of Singapore, Singapore
- **A Study on Program Evaluation and Review Technology Based on Cloud Model**
Wen-zhou Yan¹, Jia Niu¹, Hui-yong Su²
¹Xi'an University of Architecture & Technology, China
²National University of Singapore, Singapore
- **Innovation and Factors affecting the Success of NPD Projects: Literature Explorations and Descriptions**
Supachart Iamratanakul¹, Patricio Hernandez², Cesar Castilla¹, Dragan Milosevic¹
¹Portland State University, United States
- **Study on the Funds Allocation of R&D Projects Base on Fuzzy Random Programming**
Laixin Liang¹, Rufe Ma¹, Yuyun Huang¹
¹Central South University, China
- **R&D Project Management Standardization: An Empirical Research**
Guilin Guo¹, Yidong Chen², Yuan Sun¹, Xiao-hong Zhou¹
¹Zhejiang University, China
²China United Engineering Corporation, China

Global Manufacturing and Management (1)

Session A (11:00 - 12:30)
Monday - December 3, 2007
Room: Jupiter III

Chairs: Ushio Sumita
Lin Gong

Abstracts: See page 61

- **Modeling Organizations Based on Value Streams**
Virgilio Cruz-Machado¹, Jose Tavares¹
¹UNIDEMI, FCT-UNL, Portugal
- **Reference Process for Global Sourcing**
Robert Alard¹, Josef Oehmen¹, Philipp Bremen¹
¹ETH Zurich, Switzerland
- **Strategy Evolution and Market Leaderships: New Evidences from Semiconductor Memory Industry**
Daw Ma¹, Jiang Yu²
¹Chung-Hua Institution for Economic Research, Taiwan
²University of Cambridge, United Kingdom
- **Performance Value Analysis for the Justification of Lean Manufacturing Systems**
Anand Gurumurthy¹, Rambabu Kodali¹
¹Birla Institute of Technology & Science, Pilani, India
- **A Method of Optimum Product Platform Parameters Planning**
Lingxuan Zhao¹, Ping Jiang¹, Xiaoyun Wang¹, Jianguo Ding¹, Runhua Tan¹
¹Hebei University of Technology, China
- **Quantifying World-Class using AHP for Manufacturing Industries**
Rambabu Kodali¹, Monica Sharma¹
¹Birla Institute of Technology & Science, Pilani, India

Global Manufacturing and Management (2)

Session B (13:30 - 15:00)
Monday - December 3, 2007
Room: Jupiter III

Chairs: Daw Ma
Shrees hail Pharsiyawar

Abstracts: See page 62

- **The Synergetic Impact of Manufacturing Strategy Development on Operations Based Non-financial Performance**
Chi-Horng Liao¹, Ming-Lang Tseng², Yuan Hsu Lin², Pi Lan Ho³
¹Ta-Hwa Institute of Technology, Taiwan
²Ming-Dao University, Taiwan
³Nanya Institute of Technology, Taiwan
- **Analysis of Global Manufacturing Top 200: Applications of Zipf-Mandelbrot Law and Its Transposing Type**
Qiang Wu¹
¹University of Science & Technology of China, China
- **Impact of Skeleton Imports on Hollowing Out Production Bases Outside Japan**
Ushio Sumita¹, Rina Isogai¹
¹University of Tsukuba, Japan
- **Multi-strategies Risk Programming for Virtual Enterprise Based on Ant Colony Algorithm**
Min Huang¹, Xuejing Wu¹, Fuqiang Lu¹, Xingwei Wang¹
¹Northeastern University, China
- **Japanese Techniques and Indian Manufacturing: Some Inferences**
Jamal Farooque¹, Asit Mohapatra²
¹Aligarh Muslim University, India
²Reliance Retail, Mumbai, India
- **Management Control System on International Outsourcing Manufacturing**
Joel Koenig¹, François Geiskopf¹, Emmanuel Caillaud¹, Michel Sonntag¹
¹Institut National des Sciences Appliquées, France

The CATER System for Vehicle Mass Customization

Session C (15:30 - 17:30)
Monday - December 3, 2007
Room: Jupiter III

Chairs: Halimahtun Mohd Khalid
Martin Helander

Abstracts: See page 63

- **The CATER Approach to Vehicle Mass Customization**
Halimahtun M. Khalid¹, Manfred Dangelmaier², Tek Yong Lim¹
¹Damai Sciences Sdn Bhd, Malaysia
²Fraunhofer IAO, Germany
- **Analytical Modeling and Evaluation of Customer Citarasa in Vehicle Design**
Roger Jiao¹, Qianli Xu¹, Martin Helander¹
¹Nanyang Technological University, Singapore
- **Citarasa Engineering Model for Affective Design of Vehicles**
Martin Helander¹, Hong Peng¹, Halimahtun M. Khalid²
¹Nanyang Technological University, Singapore
²Damai Sciences Sdn Bhd, Malaysia
- **Customer Requirement Analysis Based on an Analytical Kano Model**
Qianli Xu¹, Roger Jiao¹, Xi Yang¹, Martin Helander¹, Halimahtun M. Khalid², O. Anders³
¹Nanyang Technological University, Singapore
²Damai Sciences Sdn Bhd, Malaysia
³Volvo Technology Corporation, Sweden
- **Semantic Analysis of Verbal Communication in Cross-functional Design Team: A Study of Driver Seat Design in an Automotive Company**
Xi Yang¹, Martin Helander¹
¹Nanyang Technological University, Singapore
- **Citarasa Based Vehicle Planning System**
Tek Yong Lim¹, Halimahtun M. Khalid¹, Cheng Ni²
¹Damai Sciences Sdn Bhd, Malaysia
²ICIDO GmbH, Germany
- **Citarasa Driven Vehicle Configurator**
Petri Helo¹, Sami Kyllönen¹, Roger Jiao²
¹University of Vaasa, Finland
²Nanyang Technological University, Singapore
- **Middleware Platform for Customizable Vehicle Reconfiguration**
Pheichin Lim¹, YinChai Wang¹, Narayanan Kulathuramaiyer¹
¹Universiti Malaysia Sarawak, Malaysia

SESSION SCHEDULES

Tuesday – December 4, 2007

09:00 to 10:30 - Keynote Speech and Meet-the-Editors Panel <i>Room: Venus Ballroom</i>		
Session D (11:00 – 12:30)	Session E (13:30 – 15:00)	Session F (15:30 – 17:30)
Technology and Knowledge Management (TM-4) <i>Room: Venus I</i>	Technology and Knowledge Management (TM-5) <i>Room: Venus I</i>	Technology and Knowledge Management (TM-6) <i>Room: Venus I</i>
The Science in Service Development (S5) <i>Room: Venus II</i>	Service Innovation and Management (SIM-1) <i>Room: Venus II</i>	Service Innovation and Management (SIM-2) <i>Room: Venus II</i>
Supply Chain Management (SCM-4) <i>Room: Mercury I</i>	Supply Chain Management (SCM-5) <i>Room: Mercury I</i>	Supply Chain Management (SCM-6) <i>Room: Mercury I</i>
Operations Research and Application (OR-4) <i>Room: Mercury II</i>	Operations Research and Application (OR-5) <i>Room: Mercury II</i>	Operations Research and Application (OR-6) <i>Room: Mercury II</i>
Design Analysis and Methods (DA-4) <i>Room: Mercury III</i>	Design Analysis and Methods (DA-5) <i>Room: Mercury III</i>	Production Planning and Control (PPC-1) <i>Room: Mercury III</i>
Systems Modeling and Simulation (SMS-1) <i>Room: Jupiter I</i>	Systems Modeling and Simulation (SMS-2) <i>Room: Jupiter I</i>	Systems Modeling and Simulation (SMS-3) <i>Room: Jupiter I</i>
Quality and Reliability Engineering (QRE-1) <i>Room: Jupiter II</i>	Quality and Reliability Engineering (QRE-2) <i>Room: Jupiter II</i>	Quality and Reliability Engineering (QRE-3) <i>Room: Jupiter II</i>
Manufacturing Systems (MS-1) <i>Room: Jupiter III</i>	Manufacturing Systems (MS-2) <i>Room: Jupiter III</i>	Manufacturing Systems (MS-3) <i>Room: jupiter III</i>

CONFERENCE DINNER
Room: Venus Ballroom

Technology and Knowledge Management (4)

Session D (11:00 - 12:30)
Tuesday - December 4, 2007
Room: Venus I

Chairs: Sardar Islam
Chia-Liang Hung

Abstracts: See page 64

- **A New Weighting Method for Detecting Outliers in IPA Based on Choquet Integral**
Hsiang-Chuan Liu¹, Chin-Chun Chen², Der-bang Wu³, Yu-Du Jheng³
¹Asia University, Taiwan
²Min-Hwei College of Health Care Management, Taiwan
³Taichung University, Taiwan
- **A Nonlinear Regression Model Based on Choquet Integral with ϵ -Measure**
Hsiang-Chuan Liu¹, Wen-Chih Lin¹, Kai Yi Chang², Wei-Sheng Weng²
¹Asia University, Taiwan
²Taichung University, Taiwan
- **Understanding the Behavioral Intention to Use ERP Systems: An Extended Technology Acceptance Model**
Cigdem Altin Gumussoy¹, Fethi Calisir¹, Armagan Bayram¹
¹Istanbul Technical University, Turkey
- **Knowledge Sharing in Product Development: A case study of a high-tech Company in China**
Xian Guo Zhang¹, Jian Mei Yang¹, Wei Hu¹
¹South China University of Technology, China
- **Technique of Product Technology Evolutionary Potential Mapping Based on Patent Analysis**
Jianhui Zhang¹, Huangao Zhang¹, Jianguang Sun¹, Runhua Tan¹
¹Hebei University of Technology, China
- **Research on the Mode of Firm's Technology Acquisition Based on the Growth of Technological Capability: A Case Study**
Xinmin Peng¹, Guoqing Yan², Yingbo Zhou³
¹Zhejiang Wanli University, China
²Zhejiang Wanli University, China
³Zhejiang University, China

Technology and Knowledge Management (5)

Session E (13:30 - 15:00)
Tuesday - December 4, 2007
Room: Venus I

Chairs: Hsiang-Chuan Liu
Jason Woodard

Abstracts: See page 65

- **Technology and Productivity – Why We Get One Without the Other?**
Shreeshail Pharsiyawar¹, Umesh Bhushi¹, Channappa Javalagi¹, Shivaprasad Dandagi²
¹Basaveshwar Engineering College, Bagalkot, India
²KLECEIT, India
- **Technology Transfer to China in Automobile Industry: Difference between Japanese and Western Firms**
Shucheng Han¹
¹Wuhan University of Technology, China
- **A Study on the Evolution of Technological Capability Based on Technology Import: A Case From Yizheng Chemical Fiber Company Limited**
Jisheng Peng¹, Wenxiang Sun², Jinfu Lu³, Butong Zhao⁴, Xiujiang Wang¹
¹Nanjing University, China
²Nanjing Audit University, China
³Yizheng Chemical Fiber Company Limited, China
⁴Jiangsu Teachers University of Technology, China
- **The Relationship between High-Technology Export and Low-and-Medium-Technology Export: Evidence and Policy Implications**
Qiang Wu¹, Juan Zhou¹, Liang Liang¹
¹University of Science & Technology of China, China
- **A Research on Coordinated Development Relationship of Technical Standard, Intellectual Property and Technical Innovation**
Liyang Wang¹, Jin Chen², Fei Cai³
¹Zhejiang University & China Jiliang University, China
²Zhejiang University, China
³Academy of Metrology Science of Zhejiang, China
- **Measuring the Constructs and Mechanism of the Value Co-creation System with Customers**
Xiang Zhang¹, Rongqiu Chen², Li Li²
¹Beijing Institute of Technology, China
²Huazhong University of Science & Technology, China

Technology and Knowledge Management (6)

Session F (15:30 - 17:30)
Tuesday - December 4, 2007
Room: Venus I

Chairs: Marko Torkkeli
Myung Hwan Yun

Abstracts: See page 66

- **Knowledge Modelling for Supporting Decision Making in Optimal Distributed Design Process**
Ricardo Mejía-Gutiérrez¹, Xavier Fischer², Fouad Bennis³
¹IRCCyN-ECN, LIPSI-ESTIA, France
²LIPSI-ESTIA, TREFFE-ENSAM, France
³IRCCyN-ECN, France
- **Recognizing the Core Technology Capabilities for Companies through Patent Co-citations**
Hsiao-Chung Wu¹, Hung-Yi Chen¹
¹Chaoyang University of Technology, Taiwan
- **An Evaluation System based on Concepts and Components of End-User Computing Competency**
Chui Young Yoon¹, Keon Myung Lee¹
¹Chungbuk National University, South Korea
- **Knowledge management Barriers: An Interpretive Structural Modeling Approach**
M.D Singh¹, R. Kant¹
¹Motilal Nehru National Institute of Technology, Allahabad, India
- **Market Scope of Vendors in the OSS Software Market**
Lauri Frank¹, Eetu Luoma¹, Pasi Tyräinen¹
¹University of Jyväskylä, Finland
- **An Empirical Study on the Relationship between Alliance Network Environment and Knowledge Creation Capabilities of Tech-typed SME**
Cui-hua Wu¹, Yao-wen Xue¹, Jing-yu Qi², Hai-ling Guan¹
¹Taiyuan University of Science & Technology, China
²Capital University of Economics & Business, China
- **Engineering Management or Management of Technology? A Bibliometric Study of IEEE TEM**
Alan Pilkington¹
¹Royal Holloway, University of London, United Kingdom
- **The Assessment of Innovation Capacity of High-Tech Industries with the View of Sustainable Development: An Empirical Study in China**
Chunping Liu¹, Gengyou Han²
¹Beijing University of Aeronautics & Astronautics, China
²Chinese Academy of Sciences, China

The Science in Service Development

Session D (11:00 - 12:30)
Tuesday - December 4, 2007
Room: Venus II

Chairs: Kay Chuan Tan
Yonggui Wang

Abstracts: See page 67

- **The Antecedents and Consequences of Relationship Strength: A Disaggregated Approach in the Context of a Chinese Service Industry**
Yonggui Wang¹, Guicheng Shi², Zhong Yao³
¹Nanjing University, China
²Macau University of Science & Technology, China
³Beijing University of Aeronautics and Astronautics, China
- **Consumer Creativity, Participation and Satisfaction: The Influence of Domain Knowledge in Service Context**
He Jia¹, Yonggui Wang¹
¹Nanjing University, China
- **Inter-functional Coordination for New Service Development**
Qiang Lu¹, Victoria da Gama²
¹Shenzhen Graduate School, Harbin Institute of Technology, China
²University of Auckland, New Zealand
- **A Survey on Six Sigma Implementation in Singapore Service Industries**
Ayon Chakrabarty¹, Kay Chuan Tan¹
¹National University of Singapore, Singapore
- **Are Services Really That Valuable? Two Diverse Cases in an Intra-Company Technology Transfer Setting**
Henry Kostamovaara¹, Marko Seppänen¹
¹Tampere University of Technology, Finland
- **Services Science, Management, and Engineering: A Literature Review in the Perspective of Management Science**
Hui-Fen Li¹, Jian-Jun Wang¹, Hong-Lei Yu¹, De-Li Yang¹
¹Dalian University of Technology, China

Service Innovation and Management (1)

Session E (13:30 - 15:00)
Tuesday - December 4, 2007
Room: Venus II

Chairs: Tien-Tsai Huang
Qiang Lu

Abstracts: See page 68

- **Motives, Trends and Effects in Cross-Border Acquisitions in the Finnish Technical Engineering Industry**
Ville Ojanen¹, Pekka Salmi¹, Marko Torkkeli¹
¹Lappeenranta Univ. of Tech., Finland
- **Analyzing Customer Satisfaction and Service Level Using AI technique**
Hsiao Ching Chen¹, Hui-Ming Wee¹, Yung-Tsan Jou¹, Yao-Hung Hsieh¹
¹Chung Yuan Christian University, Taiwan
- **Eliminating Emergency Department Wait by BPR Implementation**
Arun Kumar¹, Sung Shim²
¹Nanyang Technological University, Singapore
²Seton Hall University, United States
- **Complexities in Managing Technology and Operational Driven Solutions**
Rajenlall(Raj) Siriram¹
¹Dimension Data, South Africa
- **Analysis of Institutional Factors Influencing the Service Innovation - A Case of Chinese Software Industry**
Weilin Zhao¹, Chihiro Watanabe¹
¹Tokyo Institute of Technology, Japan
- **e-Government Reform and Shared Services in Taiwan**
Johannes K. Chiang¹, Kenny Huang¹, Eric Yen¹
¹MIS, National Chengchi University, Taiwan

Service Innovation and Management (2)

Session F (15:30 - 17:30)
Tuesday - December 4, 2007
Room: Venus II

Chairs: Ville Ojanen
Rajenlall(Raj) Siriram

Abstracts: See page 69

- **Evaluating Customer Satisfaction Using Fuzzy Model Based on Flexible Expert Weight**
Tien-Tsai Huang¹
¹University, Taiwan
- **Research on Incentive Mechanism to Promote Energy Efficiency in Existing Buildings**
Hongbo Wang¹, Changbin Liu²
¹Harbin Institute of Technology, China
²Beijing Institute of Civil Engineering, China
- **Strategic Logistics, a Way to Evolve Towards a Lean Organisation**
Manuel Carrasqueira¹, Virgilio Cruz-Machado²
¹QUALISEG, Portugal
²UNIDEMI, FCT-UNL, Portugal
- **Researches on the Relationship between Mechanism of Service Innovation and Knowledge Creation in the Alliance Network**
Li-cheng Ren¹, Cui-hua Wu², Chunfeng Chai², Yong-yun Zhang², Kanliang Wang³
¹Xi'an Jiao Tong University, Taiyuan University of Science & Technology, China
²Taiyuan University of Science & Technology, China
³Xi'an Jiao Tong University, China
- **The Interaction based Innovation Process of Architectural Design Service**
Jingbo Zhang¹, Yan Tao¹
¹Zhejiang University, China
- **Service Quality to Loyalty- Effect of Function and Facility**
Vikram Singh¹, Sandeep Grover¹, Ashok Kumar¹
¹YMCA Institute of Engineering, India
- **Correlation Among Organizational Position Element with Corporate Governance's Character**
Aries Susanty¹, Ubuh Buchara Hidajat¹
¹Bandung Institute of Technology, Indonesia
- **Lead Using or Lead Refusing? An Exploratory Examination of Open Innovation Activities by Lead Users in Mechanical Engineering**
Christian Schultz¹, Michael Nolting¹, Kirsti Dautzenberg¹, Gordon Müller-Seitz¹, Guido Reger¹
¹University of Potsdam, Germany

Supply Chain Management (4)

Session D (11:00 - 12:30)
Tuesday - December 4, 2007
Room: Mercury I

Chairs: Sun Jing
Antonio Messeni Petruzzelli

Abstracts: See page 70

- **Capacity Sourcing using a Reservation Contract**
Jishnu Hazra¹, B Mahadevan¹
¹Indian Institute of Management Bangalore, India
- **Purchasing Heuristic Algorithm for Minimizing Cost Related to By-size Inventory in Frozen Shrimp Industry**
Supachai Pathumnakul¹, Sakda Khamjan², Kullapapruk Piewthongngam¹
¹Khon Kaen University, Thailand
²Kasetsart University Chalermphrakiat Sakonnakorn Province Campus, Thailand
- **Tradeoff Between Expected Reward and Conditional Value-at-Risk Criterion in Newsvendor Models**
Minghui Xu¹, Frank Y Chen²
¹Wuhan University, China
²The Chinese University of Hong Kong, Hong Kong
- **Buyer-Vendor Coordination Through Quantity Discount Policy Under Asymmetric Cost Information**
Santanu Sinha¹, Sarada Prasad Sarmah¹
¹Indian Institute of Technology Kharagpur, India
- **Planning for Supply Chain with Seasonal Variable Delivery Time**
Haiying Wang¹, Dacheng Liu¹, Hua Ding²
¹Tsinghua University, China
²Shenyang Institute of Chemical Technology, China
- **Trading options in Supply Chain**
Xin Zeng¹, Xiaoning Jin², Qiang Wang³
¹London School of Economics, United Kingdom
²Shanghai Jiao Tong University, China
³National University of Singapore, Singapore

Supply Chain Management (5)

Session E (13:30 - 15:00)
Tuesday - December 4, 2007
Room: Mercury I

Chairs: Jing Wang
Szu Hui Ng

Abstracts: See page 71

- **A Two-phase Algorithm for the Manufacturer's Pallet Loading Problem**
Kun-Chih Wu¹, Ching-Jung Ting¹
¹Yuan Ze University, Taiwan
- **Inventory Rationing in a Capacitated System with Backorders and Lost sales**
Ying Tang¹, Dongsheng Xu², Weihua Zhou³
¹Zhejiang University of Technology, China
²Sun Yat-Sen University, China
³Zhejiang University, China
- **A Hybrid Search Heuristic for Supply Chain Planning with a Multi-Level Multi-Item Capacitated Lot Sizing Model**
Hyun Joon Shin¹
¹Sangmyung University, South Korea
- **A Two-commodity Deteriorating Inventory Model with Price-dependent Demand**
Ying Feng¹, X. Q. Cai², F. S. Tu¹
¹Nankai University, China
²Nankai University, Chinese University of Hong Kong, China
- **Multi-Location Inventory System with Lateral Transshipments and Emergency Orders**
Siradej Chartnuyom¹, Moon-Kyu Lee², Lee Luong¹, Romeo Marian¹
¹University of South Australia, Australia
²Keimyung University, South Korea
- **A Combined Spatial Cluster Analysis - Traveling Salesman problem Approach in Location-routing problem: A Case Study in Iran**
Mohammad Saeed Zaeri¹, Jamal Shahrabi², Mahmood Pariazar², Arash Morabbi³
¹Member of Young Researchers Club, Islamic Azad University, Iran
²Amirkabir University of Technology, Iran
³Islamic Azad University, Iran

Supply Chain Management (6)

Session F (15:30 - 17:30)
Tuesday - December 4, 2007
Room: Mercury I

Chairs: Sarada Prasad Sarmah
Arun Kumar

Abstracts: See page 72

- **Logistics Flows Coordination in Supply Chains Using Enterprise Input-Output Models**
Vito Albino¹, Antonio Messeni Petruzzelli¹
¹Politecnico di Bari, Italy
- **A Fuzzy Aggregate Production Planning Model for Make-to-Stock Environments**
Reza Tavakkoli-Moghaddam¹, Masoud Rabbani¹, Amir Hossein Charehgozli¹, Nima Zaeerpour¹
¹University of Tehran, Iran
- **A Bi-level Programming Model for Supplier Selection in Constructing Logistics Service Supply Chain**
Mei Guo¹, JinFu Zhu¹, XiuLi Zhao¹
¹Nanjing University of Aeronautics & Astronautics, China
- **Genetic based approach for the Multi Product Multi Period Inventory Routing Problem**
Nur Arina Bazilah Aziz¹, Noor Hasnah Moin¹
¹University of Malaya, Malaysia
- **Theory of Inventive Problem Solving (TRIZ) Applied in Supply Chain Management of Petrochemical Projects**
Reza Movarrei¹, Sara Vessal¹
¹Project Management R&D Center, Iran
- **A Case Study for Synchronized Scheduling of manufacturing and air transportation in Consumer Electronics Supply Chain**
Kunpeng Li¹, Sivakumar Appa Iyer², Qing Fu², Xianfei Jin²
¹Huazhong University of Science & Technology, China
²Nanyang Technological University, Singapore
- **Improving the Performance of Manufacturer-distributor Partnerships Through Knowledge Transfer – a Knowledge-based Perspective**
Lingyun Wang¹, Päivi Iskanius¹, Pekka Kess¹
¹University of Oulu, Finland
- **A Control Chart Design for Supplier in View of Quality, Due Time and Cost**
Sun Jing¹, M. Matsui¹
¹The University of Electro-Communications, Japan

Operations Research and Application (4)

Session D (11:00 - 12:30)
Tuesday - December 4, 2007
Room: Mercury II

Chairs: Deniz Aksen
Farnaz Barzinpour

Abstracts: See page 73

- **Currency Arbitrage Detection Using A Binary Integer Programming Model**
Wan Mei Soon¹, Heng Qing Ye²
¹NIE, Nanyang Technological University, Singapore
²Hong Kong Polytechnic University, National University of Singapore, Hong Kong
- **Teaching and Playback Control System for Parallel Robot for Ankle Joint Rehabilitation**
Jianguang Sun¹, Jinyong Gao¹, Jianhui Zhang¹, Runhua Tan¹
¹Hebei University of Technology, China
- **Data Construction Method for Basis Selection in RBF Networks**
Chun-Jung Huang¹, Hsiao-Fan Wang¹
¹National Tsing Hua University, Taiwan
- **Analogies between Flexible Job Shop Scheduling and Vehicle Routing Problem**
Zouel Kouki¹, B. Fayech Chara², S. Hammadi², M Ksouri¹
¹Ecole Nationale des Ingénieurs de Tunis, Tunisia
²Ecole Centrale de Lille, France
- **Solving Capacitated P-Median Problem (CPMP) using Genetic Algorithm**
Keivan Ghoseiri¹, S.Farid Ghannadpour¹
¹Iran University of Science & Technology, Iran
- **Chaos Theory and Application in Sells Management**
Mahmood Pariazar¹, Jamal Shahrabi², Soheil Mahmoodzadeh³, Mohammad Saeed Zaeri⁴
¹Member of Young Researchers Club (Islamic Azad University), Iran
²Amirkabir University of Technology, Iran
³Allameh Tabatabaee University, Iran
⁴Member of Young Researchers Club, Islamic Azad University, Iran

Operations Research and Application (5)

Session E (13:30 - 15:00)
Tuesday - December 4, 2007
Room: Mercury II

Chairs: Jih-An Chen
Joaquin Sicilia-Rodriguez

Abstracts: See page 74

- **Stochastics in Discrete Logistics Models: What Can We Do?**
Stein W. Wallace¹, Michal Kaut², Teodor G. Crainic³, Arnt-Gunnar Lium⁴
¹The Chinese University of Hong Kong, Hong Kong
²Molde University College, Norway
³University of Quebec at Montreal, Canada
⁴SINTEF, Norway
- **A General Method to Apply Dantzig-Wolfe Decomposition for Variational Inequalities with Affine Constraints**
William Chung¹
¹City University of Hong Kong, Hong Kong
- **A 2opt-DPX Genetic Local Search for Solving Symmetric Traveling Salesman Problem**
Keivan Ghoseiri¹, Hassan Sarhadi¹
¹Iran University of Science & Technology, Iran
- **Vertical Decomposition Approach To Solve Single Stage Capacitated Warehouse Location Problems**
Priyanka Verma¹, R R K Sharma¹
¹Indian Institute of Technology Kanpur, India
- **An Application of Tabu Search Algorithm on Cost-based Job Shop Problem with Multiple Objectives**
Zhecheng Zhu¹, Kien Ming Ng¹, Hoon Liong Ong¹
¹National University of Singapore, Singapore

Operations Research and Application (6)

Session F (15:30 - 17:30)
Tuesday - December 4, 2007
Room: Mercury II

Chairs: Adam Ng
Pen-Yuan Liao

Abstracts: See page 75

- **Fuzzy Linear Regression Models with Absolute Errors and Optimum Uncertainty**
Hamed Shakouri G.¹, Reza Nadimi¹, Farid Ghaderi¹
¹University of Tehran, Iran
- **Modelling Corporate Financial Crisis Management: Optimal Cashflow Management in SMEs**
M. Aba-Bulgu¹, Sardar Islam²
¹MSM Loss Management, Australia
²Victoria University, Australia
- **Product Development Performance Measures in Manufacturing Firm**
Zhonghang Bai¹, Peng Zhang¹, Fang Liu¹, Runhua Tan¹
¹Hebei University of Technology, China
- **Dynamic Preventive Maintenance Policy Based on Health Index**
Wenzhu Liao¹, Ershun Pan¹, Lifeng Xi¹
¹Shanghai Jiao Tong University, China
- **Development of A New Model for the Flowshop Problem**
Mostafa Mesgari Mashhadi¹, Edward Stafford², Fan Tseng²
¹University of Tehran, Iran
²University of Alabama in Huntsville, United States
- **A Hybrid Optimization Methods for Nonlinear Programming**
Erwie Zahara¹, Yi-Tung Kao², Chia Hsin¹
¹St. John's University, Taiwan
²Tatung University, Taiwan
- **Realtime Dynamic Multilevel Optimization for Demand-Side Load Management**
Duy Long Ha¹, Florent Frizon de Lamotte¹, Quoc Hung Huynh¹
¹G-SCOP, France
- **Manufacturing Parts Sourcing with Delayed Transportation Policy**
Tugce Erkan¹, Emre Sancak¹, Elif Yildirim¹, Sibel Salman¹
¹Koc University, Turkey

Decision Analysis and Methods (4)

Session D (11:00 - 12:30)
Tuesday - December 4, 2007
Room: Mercury III

Chairs: Xiansheng Qin
Chengter Ho

Abstracts: See page 76

- **Environmental Practices for Manufacturing Performance: FANP Approaches**
Ming-Lang Tseng¹, Yuan-Hsu Lin¹, Jui Hsiang Chiang², Jianhui Guo³
¹Ming-Dao University, Taiwan
²Toko University, Taiwan
³De La Salle Araneta University, Philippines
- **Prioritization of Competitive Priority in Cleaner Production Implementation**
Yuan Hsu Lin¹, Ming-Lang Tseng¹, Jui Hsiang Chiang², Yow Mow Chen³
¹Ming-Dao University, Taiwan
²Toko University, Taiwan
³Tunghai University, Taiwan
- **Evaluation of Worker Productivity Improvement Using ISM and FAHP**
YiLi Cheng¹, Anthony SF Chiu², Ming-Lang Tseng³, Yuan Hsu Lin³
¹Wu Feng Institute of Technology, Taiwan
²De La Salle University, Philippines
³Ming-Dao University, Taiwan
- **New Product Portfolio Selection Using Fuzzy Logic**
Ching-Torng Lin¹
¹Dayeh University, Taiwan
- **Applying Incomplete Linguistic Preference Relations to a Selection of ERP System Suppliers**
Tien-Chin Wang¹, Yu-Chen Chiang¹, Shu-Chen Hsu¹
¹I-Shou University, Taiwan
- **A Fuzzy TOPSIS Approach with Entropy Measure for Decision-Making Problem**
Tien-Chin Wang¹, Hsien-Da Lee¹, Michael C.S Chang²
¹I-Shou University, Taiwan
²I-shou University, Taiwan

Decision Analysis and Methods (5)

Session E (13:30 - 15:00)
Tuesday - December 4, 2007
Room: Mercury III

Chairs: Jerzy Michnik
Shurong Tong

Abstracts: See page 77

- **On Decision Criteria for One-Shot Decision with Possibilistic Information**
Peijun Guo¹
¹Yokohama National University, Japan
- **The Fuzzy-Entropy Approach for Techno-economic Analysis of The Green Construction Energy-saving Structure System**
Wen-zhou Yan¹, Jia Niu¹, Hui-yong Su²
¹Xi'an University of Architecture & Technology, China
²National University of Singapore, Singapore
- **An Effective Heuristic Algorithm based on Segmentation for Solving a Multilevel Lot-sizing Problem**
Ikou Kaku¹, Zhaoshi Li¹, Chunhui Xu²
¹Akita Prefectural University, Japan
²Chiba Institute of Technology, Japan
- **Using AHP in Decision Analysis - the Case of Vietnam State Securities Commission**
Cher-Min Fong¹, Chengter Ho², Hoang Linh Nguyen¹
¹National Sun Yat-Sen University, Taiwan
²National Kaohsiung University of Applied Sciences, Taiwan
- **Fuzzy AHP in Prioritizing Feeders for Maintenance in Nuclear Power Plants**
Srividya A.¹, Suresh H.N.¹, Verma A.K.¹
¹Indian Institute of Technology Bombay, India

Production Planning and Control (1)

Session F (15:30 - 17:30)
Tuesday - December 4, 2007
Room: Mercury III

Chairs: Kim Leng Poh
Kuang-Yao Wu

Abstracts: See page 78

- **Semiconductor Production Planning Using Robust Optimization**
Adam T.S. Ng¹, John Fowler²
¹National University of Singapore, Singapore
²Arizona State University, United States
- **TOC/DBR Based Production Planning and Control in a Manufacturing System with Multiple System Bottlenecks**
Zailin Guan¹, Yunfang Peng¹, Xiaoling Yang¹, Xinyu Shao¹
¹Huazhong University of Science & Technology, China
- **Market-based Negotiation Model for Employ-driven Distributed Production Scheduling**
Moonsoo Shin¹, Jungtae Mun¹, Mooyoung Jung¹
¹POSTECH, South Korea
- **Decentralized Planning and Control for Assembly Areas Driven by Gentelligent® Parts**
Matthias Schmidt¹, Philip Fronia¹, Frank Fisser¹, Peter Nyhuis¹
¹Leibniz Universität Hannover, Germany
- **Analytical and Heuristic Approaches for Solving the Spatial Scheduling Problem**
Piyush Raj¹, Rajiv Srivastava¹
¹Indian Institute of Management Lucknow, India
- **A Bayesian Network Approach to Job-Shop Rescheduling**
Nur Aini Masrurroh¹, Kim Leng Poh¹
¹National University of Singapore, Singapore
- **Process Disturbance Identification Using ICA-Based Image Reconstruction Scheme With Neural Network**
Shien-Ping Huang¹, Chih Chou Chiu², Deborah F. Cook³, Chi-Jie Lu⁴
¹Taipei College of Maritime Technology, Taiwan
²National Taipei University of Technology, Taiwan
³Virginia Polytechnic Institute & State University, United States
⁴Ching Yun University, Taiwan
- **An Empirical Investigation of Learning Curve Laws in the Tile Manufacturing Industry**
Anna Chatzimichali¹, Vassilios Tourassis¹
¹Democritus University of Thrace, Greece

Systems Modeling and Simulation (1)

Session D (11:00 - 12:30)
Tuesday - December 4, 2007
Room: Jupiter I

Chairs: Jayendran Venkateswaran
Kiekang Chao

Abstracts: See page 79

- **Design Management for Project Success**
Leon Pretorius¹, Arie Wessels², Alex C Rooney²
¹University of Johannesburg, South Africa
²Denel Dynamics, South Africa
- **Service-Oriented Architecture on a Windows Cluster for Spreadsheet Simulation**
Juta Pichitlamken¹, Putchong Uthayopas¹, Supasit Kajkamhaeng¹, Noocharin Tippayawannakorn¹
¹Kasetsart University, Thailand
- **Integrated Performance Measurement to Support Strategic Decision Making in Engineering Organisations**
John Davis¹, Alasdair MacDonald¹, Emad Marashi²
¹University of Bristol, United Kingdom
²Power & Water University of Technology, Iran
- **A Vehicle-Target Simulation Model for Network-Centric Joint Air Operations**
Madjid Tavana¹, Nathaniel Gemelli², Robert Wright²
¹La Salle University, United States
²Air Force Research Laboratory, United States
- **Stranded on Emergency Isle: Modeling Competition for Cardiac Services using Survival Analysis**
Scott Levin¹, Jin Han¹, Dominik Aronsky¹, Chuan Zhou¹, Nathan Hoot¹, Lori Kelly¹, Dan France¹
¹Vanderbilt University, United States

Systems Modeling and Simulation (2)

Session E (13:30 - 15:00)
Tuesday - December 4, 2007
Room: Jupiter I

Chairs: Leon Pretorius
Yiping Lu

Abstracts: See page 80

- **A Business Process Simulation Environment based on Workflow and Multi-Agent**
Haiyan Zhao¹, Jian Cao²
¹Shanghai University for Science & Technology, China
²Shanghai Jiao Tong University, China
- **A Multi-Stage Modeling Framework for Web Service Composition**
Jian Xiao¹, Li Zheng¹
¹Tsinghua University, China
- **Modeling Reconfigurable Information Systems by using an Executable Algebraic Framework**
Yi Huang¹, Benjamin Koo¹, Li Zheng¹
¹Tsinghua University, China
- **Language Integration for Model Validation**
Thouraya Bouabana-Tebibel¹
¹National Institute of Computer Science, Algeria
- **An Optimizing Applied Algorithm for Complicated non-Markov Queuing Systems via Simulation (A Case Study)**
Mohamad Mahdavi¹, Mojtaba Mahdavi¹
¹Islamic Azad University of Najafabad, Iran
- **Translating Graphical Conceptual model from STATEMATE to FNLOG**
Leila Jemni BenAyed¹, Yousra Hlaoui BenDaly²
¹Faculty of Sciences of Tunis, Tunisia
²UTIC, Tunisia

Systems Modeling and Simulation (3)

Session F (15:30 - 17:30)
Tuesday - December 4, 2007
Room: Jupiter I

Chairs: Jian Cao
Maode Ma

Abstracts: See page 81

- **A Conceptual Design Model Using Axiomatic Design, Functional Basis and TRIZ**
Ruihong Zhang¹, Jianzhong Cha¹, Yiping Lu¹
¹Beijing Jiaotong University, China
- **Designing Reusable Building Blocks of Simulation Models for FMS with Multi-Sections**
Kai-Ying Chen¹, Yi-Chun Lin¹, Mu-Chen Chen², Cheng Tah Yeh³
¹National Taipei University of Technology, Taiwan
²National Chiao Tung University, Taiwan
³National Taiwan University of Science & Technology, Taiwan
- **A Job Shop Scheduling Approach Based on Simulation Optimization**
Yan Yan¹, GuoXin Wang¹
¹Beijing Institute of Technology, China
- **On the Max-Plus Linear Representation for Event-Varying Systems with Buffer and Order Constraints**
Hiroyuki Goto¹, Keisuke Shoji¹, Hiromasa Nagai¹, Masaru Onuma¹
¹Nagaoka University of Technology, Japan
- **An Overview of Application of System Dynamics Modeling For Analysis of Indian Sugar Industry**
Channappa Javalagi¹, Umesh Bhusi¹
¹Basaveshwar Engineering College, Bagalkot, India
- **Improving Performance of a Station and Smoothing the Exit Rate in an Assembly Line**
Amir Elmi¹, Mohammad Reza Nazabadi²
¹Sharif University of Technology, Iran
²Tehran University, Iran
- **Advanced Look-ahead Based Approach (ALBA) for Distributed Simulation of Supply Chains**
Satish Tammineni¹, Jayendran Venkateswaran¹
¹Indian Institute of Technology Bombay, India
- **Abrasive Process Machine Simulation Model, a Discrete and Continuous Approach**
Henry Gasparin¹, Daniel Saloni¹, Richard Lemaster¹
¹NCSU, United States

Quality and Reliability Engineering (1)

Session D (11:00 - 12:30)
Tuesday - December 4, 2007
Room: Jupiter II

Chairs: Rong Pan
Chih Wang

Abstracts: See page 82

- **Reliability-Directed Distributed Computer-Aided Design System**
Oleg Abramov¹, Yaroslava Katueva¹, Dmitry Nazarov¹
¹*Institute for Automation & Control Processes FEB RAS, Russian Federation*
- **A Study on Software Reliability Prediction Based on Support Vector Machines**
Bo Yang¹, Xiang Li²
¹*University of Electronic Science & Technology of China, China*
²*National University of Singapore, Singapore*
- **Software Release Optimization for a Non-Kalman Filter SRGM**
Xiaoyue Jiang¹, Donglei Du², Thomas Ray¹, Sean Ghazavi¹
¹*Louisiana State University, United States*
²*University of New Brunswick, Canada*
- **Prediction of System Reliability for Multiple Component Repairs**
Yong Sun¹, Lin Ma¹, Joseph Mathew¹
¹*Queensland University of Technology, Australia*
- **The Effect of Dependency on the MRL Function of Redundant Systems**
Ali Zeinal Hamadani¹, Azam Nasri¹
¹*Isfahan University of Technology, Iran*
- **A Weighted Loss Function Approach to the Multivariate RPD Problem**
Chong Pan¹, Yi-zhong Ma¹
¹*Nanjing University of Science & Technology, China*

Quality and Reliability Engineering (2)

Session E (13:30 - 15:00)
Tuesday - December 4, 2007
Room: Jupiter II

Chairs: Bo Yang
Vinod Puranik

Abstracts: See page 83

- **Bayesian Evaluation Approach for Process Capability Based on Subsamples**
Huiming Zhu¹, Jun Yang¹, Liya Hao¹
¹*Hunan University, China*
- **Process Targeting of Multi-characteristic Product using Fuzzy Logic and Genetic Algorithm with an Interval Based Taguchi Cost Function**
Syed Mujahid¹, Salih Duffuaa¹
¹*King Fahd University of Petroleum & Minerals, Saudi Arabia*
- **Integration of Taguchi's Loss Function in the Economic Design of (x bar) -Control Charts with Increasing Failure Rate and Early Replacement**
Anas Al-Ghazi¹, Khaled Al-Shareef¹, Salih Duffuaa¹
¹*King Fahd University of Petroleum & Minerals, Saudi Arabia*
- **System Performance, Degradation, and Reliability Assessment**
Weiming Ke¹, Cuirong Ren¹, Kai Jin², Huitian Lu¹
¹*South Dakota State University, United States*
²*Texas A&M University Kingsville, United States*
- **Faults Diagnosis Based on System Model in a Discrete-part Machining System**
Shichang Du¹, Lifeng Xi¹
¹*Shanghai Jiao Tong University, China*
- **Quality Issues in Enameling of Ceramic Industry Products**
Ioannis Georgilas¹, Vassilios Tourassis¹
¹*Democritus University of Thrace, Greece*

Quality and Reliability Engineering (3)

Session F (15:30 - 17:30)
Tuesday - December 4, 2007
Room: Jupiter II

Chairs: Xiaoyue Jiang
Salih Duffuaa

Abstracts: See page 84

- **CUSUM Quality Control Chart for Monitoring Energy Use Performance**
Vinod Puranik¹
¹*Basaveshwar Engineering College, Bagalkot, India*
- **D-Optimal Reliability Test Design for Two-Stress Accelerated Life Tests**
Huairui Guo¹, Rong Pan²
¹*ReliaSoft Co., United States*
²*Arizona State University, United States*
- **VSSI X-Bar Control Charts for Processes With Multiple Assignable Causes**
Ho-Joong Lee¹, Tae-Jin Lim², Seung-Cheol Jang¹
¹*Korea Atomic Energy Research Institute, South Korea*
²*Soongsil University, South Korea*
- **A Neural Network Ensemble for Classifying Source(s) in Multivariate Manufacturing Processes**
Jian-Bo Yu¹, Lifeng Xi¹
¹*Shanghai Jiao Tong University, China*
- **Speeding-up Experiences Return During New Productions Industrialization**
Samuel Bassetto¹, Aymen Mili¹, Ali Siadat²
¹*INPG, France*
²*ENSAM-LGIPM, France*
- **A Study of Genetic Algorithm for Project Selection for Analogy Based Software Cost Estimation**
Yanfu Li¹, Min Xie¹, Thong Ngee Goh¹
¹*National University of Singapore, Singapore*
- **Research on Optimization Model of Multi IT Applications based on Nonlinear Goal Programming Method**
Hongxun Jiang¹, Yongyan Yang¹, Ming Dong¹
¹*Renmin University of China, China*
- **Reliability Analysis of a Two Unit System**
Zuhair Al Hemyari¹, Syed Rizwan²
¹*University of Nizwa, Oman*
²*Caledonian (University) College of Engineering, Oman*

Manufacturing Systems (1)

Session D (11:00 - 12:30)
Tuesday - December 4, 2007
Room: Jupiter III

Chairs: Sittichai Kaewkuekool
Jian-Bo Yu

Abstracts: See page 85

- **Optimization of Cellular Manufacturing Systems Design Using the Hybrid Approach based on the Ant Colony and Tabu Search Techniques**
Barthelemy Ateme-Nguema¹, Thien-My Dao¹
¹Ecole de technologie supérieure/University of Québec, Canada
- **Cell Formation with Workload Data in Cellular Manufacturing System Using Genetic Algorithm.**
Ponnambalam Sivalinga G¹, SudhakaraPandian R², Mohapatra S S³, Saravanasankar S²
¹Monash University, Malaysia Campus, Malaysia
²Kalasalingam University, India
³National Institute of Technology, India
- **Web-enabled Calibration of Micro Robotic System**
Yongjin (James) Kwon¹, Bill Tseng², Richard Chiou³
¹Ajou University, South Korea
²The University of Texas at El Paso, United States
³Drexel University, United States
- **The Component based Remote Management System for the FA Machine via the Internet**
Hwa-Young Jeong¹, Jeoung Woo Byun¹, Young Jae Song¹
¹Kyunghee University, South Korea
- **Study of the Industrial Influential Factors of Capital Allocation Efficiency in China's Manufacturing Industry**
Liwei Cheng¹, Jin-chan Ren¹
¹Harbin Institute of Technology, China
- **A Genetic Algorithm for Layout problems in Cellular Manufacturing Systems**
Prafulla Kulkarni¹, Kripa Shanker²
¹K.K.Wagh IEE & Research, India
²Indian Institute of Technology Kanpur, India

Manufacturing Systems (2)

Session E (13:30 - 15:00)
Tuesday - December 4, 2007
Room: Jupiter III

Chairs: Reza Tavakkoli-Moghaddam
Ponnambalam Sivalinga G

Abstracts: See page 86

- **Complex Scheduling Strategy for Dynamic Environment in Digitalization-Production Shop**
Lin Gong¹, Houfang Sun¹, Qian Xu¹
¹Beijing Institute of Technology, China
- **Considering a Cyclic Multiple-Part Type Three-Machine Robotic Cell Problem**
Isa Nakhai Kamalabadi¹, Saiedeh Gholami², Ali Hossein Mirzaei²
¹University of Kurdistan, Iran
²Tarbiat Modares University, Iran
- **An Investigation on the Multiple Attribute Decision Making (MADM) Methods for Solving the Cell Formation Problem**
Arshia Ahi¹, Behzad Ashtiani¹, M.Bahador Aryanezhad¹, Ahmad Makui¹
¹Iran University of Science & Technology, Iran
- **A Novel Collaborative Control Strategy for Collaborative Manufacturing**
Ying Zhang¹, Lijie Li²
¹Ningbo College of Health Science, China
²Ningbo City College of Vocational Technology, China
- **Multi-agent Based Reconfigurable Manufacturing Execution System**
Min Yu¹, Weimin Zhang¹, Peter Klemm²
¹Tongji University, China
²Universität Stuttgart, Germany
- **Surface Profile Tolerance Measuring Method using Kriging Method**
Jongseong Kim¹, Hoogon Choi¹
¹Sungkyunkwan University, South Korea

Manufacturing Systems (3)

Session F (15:30 - 17:30)
Tuesday - December 4, 2007
Room: Jupiter III

Chairs: Isa Nakhai Kamalabadi
Huitian Lu

Abstracts: See page 87

- **A Study of Influent Factors in Surface Quality of Hard Turning**
Sittichai Kaewkuekool¹, Vanchai Laemlaksakul², C. Rachavong³
¹King Mongkut's Institute of Technology Thonburi, Thailand
²King Mongkut's Institute of Technology North Bangkok, Thailand
³Rajamangala University of Technology Isaan, Thailand
- **The Manufacturing Strategy Formation Process Case Study of Six Iranian Manufacturing Companies**
Sepehr Ghazinoory¹, Rahman Mahdiani Khotbesara²
¹NRISP, Iran
²Young Researchers Club, Iran
- **Design of Changeable Assembly Systems – A Complexity Theory Based Approach**
Dominik T Matt¹
¹Polytechnic University of Torino, Italy
- **A Competitive Framework for the South African Clothing Industry**
Kem Ramdass¹, Leon Pretorius¹
¹University of Johannesburg, South Africa
- **Design of a Government-Subsidized Collection System for Incentive-Dependent Returns**
Ayse Gonul Tanugur¹, Deniz Aksent², Necati Aras¹
¹Bogazici University, Turkey
²Koc University, Turkey
- **Solving Permutation Flow Shop Sequencing using Ant Colony Optimization**
Fardin Ahmadizar¹, Farnaz Barzinpour¹, Jamal Arkat¹
¹Iran University of Science & Technology, Iran
- **The Product Family Design Based on Axiomatic Design**
Ping Jiang¹, Xiuping Zhao¹, Bojun Yang¹, Lingxuan Zhao¹, Runhua Tan¹
¹Hebei University of Technology, China
- **Performance Analysis of Single Shuttle and Twin Shuttle AS/RS**
Shin-Ming Guo¹, Tsai-Pei Liu²
¹National Kaohsiung First University of Science & Technology, Taiwan
²Kao Fong College, Taiwan

SESSION SCHEDULES

Wednesday – December 5, 2007

Session G (09:00 – 10:30)	Session H (11:00 – 12:30)	CLOSING AND FAREWELL LUNCH Room: Venus Ballroom
Engineering Economy and Cost Analysis (EC) <i>Room: Venus I</i>	Ethics, Education and Training (EET) <i>Room: Venus I</i>	
Human Factors (HF-3) <i>Room: Venus II</i>	Facilities Planning and Management (FPM) <i>Room: Venus II</i>	
Maintenance Modeling and Engineering (MME-1) <i>Room: Jupiter I</i>	Maintenance Modeling and Engineering (MME-2) <i>Room: Jupiter I</i>	
Information Engineering (Info E-1) <i>Room: Jupiter II</i>	Information Engineering (Info E-2) <i>Room: Jupiter II</i>	
Intelligent Manufacturing (IntM) <i>Room: Jupiter III</i>	Design Chain Management (S2) <i>Room: Jupiter III</i>	
Production Planning and Control (PPC-2) <i>Room: VIP</i>	Advanced Planning and SCM in Process Industry (S3) <i>Room: VIP</i>	
Poster Session <i>Room: Venus III</i>		



Engineering Economy and Cost Analysis

Session G (09:00 - 10:30)
Wednesday - December 5, 2007
Room: Venus I

Chairs: Sven Hvid Nielsen
Leonard Perry

Abstracts: See page 88

- **A Study on a Transportation Market with Empty Equipment Repositioning**
Ying Tang¹, Weihua Zhou²
¹Zhejiang University of Technology, China
²Zhejiang University, China
- **Extending the Undercut-proof Equilibrium to Asymmetric Settings**
Fan-Chen Tseng¹
¹Kainan University, Taiwan
- **Ecological Industrial Engineering and Eco-efficiency Analysis**
Yin Qian¹, Chunfa Li¹, Zhaoguo Zhang¹
¹Tianjin University of Technology, China
- **Cost-transparent Sourcing in China Applying Total Cost of Ownership**
Philipp Bremen¹, Josef Oehmen¹, Robert Alard¹
¹ETH Zurich, Switzerland
- **Modelling Software Quality Costs by Adapting Established Methodologies of Mature Industries**
Lars Karg¹, Arne Beckhaus¹
¹SAP Research, Germany
- **Evaluate Projects by Using Multiple Criteria Decision Making Techniques**
Soheil Mahmoodzadeh¹, Mahmood Pariazar², Mohammad Saeed Zaeri³, Mohammad Ali Torkamani⁴
¹Allameh Tabatabaee University, Iran
²Amirkabir University of Technology, Iran
³Member of Young Researchers Club, Islamic Azad University, Iran
⁴Isfahan university of Technology, Iran

Ethics, Education and Training

Session H (11:00 - 12:30)
Wednesday - December 5, 2007
Room: Venus I

Chairs: HK Tang
Weihua Zhou

Abstracts: See page 89

- **Integrating Kano's Model into E-learning Satisfaction**
Ling-Hsiu Chen¹, Hsiang-Chih Lin¹
¹Chaoyang University of Technology, Taiwan
- **A European Union (EU) co-operation program: Integral, Innovative, Industrial Product design and development, I3PD2 and Project Led Education (PLE).**
Sven Hvid Nielsen¹
¹Aalborg University, Denmark
- **Balance Score Card and Social Responsibility in Public Organizations**
Toraj Mojibi¹, M.Bahador Aryanezhad², Mojtaba Tabari³, Soheil Khorshidi⁴
¹Islamic Azad University, Firoozkuh Branch, Iran
²Iran University of Science & Technology, Iran
³Islamic Azad University, Qaemshahr Branch, Iran
⁴Department of Education, Iran
- **A Study on the Relation of the Manpower' Competency and the need of Educating & Training at the Manufacturers in Taiwan**
Ming-Ta Wu¹, Yu-Shan Cheng², Guan-Li Chen²
¹National I-Lan University, Taiwan
²National Taiwan Normal University, Taiwan
- **Managing Opportunities in the Global Knowledge Society: A Dynamich Approach for Creating Values in Pmt Development, Design and Manufacturing**
Sven Hvid Nielsen¹
¹Aalborg University, Denmark
- **Study on Effects, Limits and Current Situation of E-Learning System - an Example on Small-median Enterprises**
Chung-Hsuing Fang¹, Guan-Li Chen¹, Yueh-Ming Chiang²
¹National Taiwan Normal University, Taiwan
²Roche Products Ltd., Taiwan

Human Factors (3)

Session G (09:00 - 10:30)
Wednesday - December 5, 2007
Room: Venus II

Chairs: Arun Garg
Qin Gao

Abstracts: See page 90

- **Incorporating User Acceptance into Usability Evaluation Scheme for the User Interface of Mobile Services**
Sangwoo Bahn¹, Cheol Lee¹, Jang Hyeon Jo², Won Yong Suh¹, Joobong Song¹, Myung Hwan Yun¹
¹Seoul National University, South Korea
²Samsung Electronics Co., Ltd, South Korea
- **The Strain Index to Analyze Jobs for Risk of Distal Upper Extremity Disorders: Model Validation**
Arun Garg¹, J. Steven Moore², Jay Kapellusch¹
¹University of Wisconsin - Milwaukee, United States
²Texas A&M University, United States
- **Fatigue Driving Detecting Model based on Momentum Indices and Neural-Fuzzy Approach**
Cheng-Li Liu¹, Shiao-Tsyng Uang²
¹Vanung University, Taiwan
²Ming-Hsin University of Science & Technology, Taiwan
- **The Effects of Different Breath Alcohol Concentration and Post Alcohol Upon Driver's Driving Performance**
Yung Ching Liu¹, Chin Heng Ho¹
¹National Yunlin University of Science & Technology, Taiwan
- **A Method for Human Driven Knowledge Acquisition (Case Study in a Petrochemical Company)**
Navid Nezafti¹, Ameneh Khadivar², Ehsan Afarideh¹, Seyed Mohammad Javad Jalali³
¹Amir Kabir Polytechnique University, Iran
²Tarbiat Modares University, Iran
³Islamic Azad University, North Tehran Branch, Young Researches Club, Iran
- **A study of supporting programs for small and medium enterprises: a first stage going to "Lean"**
Romain Real¹, M. Pralus¹, M. Pillet¹, L Guizzi²
¹Université de Savoie, France
²Thésame, Annecy, France

Facilities Planning and Management

Session H (11:00 - 12:30)
Wednesday - December 5, 2007
Room: Venus II

Chairs: Ponnambalam Sivalinga G
Prafulla Kulkarni

Abstracts: See page 91

- **Solving a New Mathematical Model of a Closed-Loop Layout Problem with Unequal-Sized Facilities by a Genetic Algorithm**
Reza Tavakkoli-Moghaddam¹, Hadi Panahi¹
¹University of Tehran, Iran
- **Urban Road Interchange type Selection Based on Multiple Attributes Decision Making**
Kejun Long¹, Xiaoguang Yang², Jianlong Zheng¹
¹Changsha University of Science & Technology, China
²Tongji University, China
- **Applying a Revised VAM to a Multi-level Capacitated Facility Location Problem**
Ying-Yen Chen¹, Hsiao-Fan Wang¹
¹National Tsing Hua University, Taiwan
- **Audit Strategy for Improved Performability of Facilities Management**
Tony Halim¹, Loon Ching Tang¹
¹National University of Singapore, Singapore
- **Inventory-Location Models for Remote and Direct Retailing with Time-Sensitive Demand**
Oded Berman¹, Dmitry Krass¹, Mozart Menezes²
¹University of Toronto, Canada
²HEC, France
- **A Conceptual Model for Knowledge Flow in Supply Chain**
Amenah Khadivar¹, Ali Rajabzadeh¹, Mehdi Khani², Seyed Mohammad Javad Jalali³
¹Tarbiat Modares University, Iran
²University of Mazandaran, Iran
³Islamic Azad University, North Tehran Branch, Young Researches Club, Iran

Maintenance Modeling and Engineering (1)

Session G (09:00 - 10:30)
Wednesday - December 5, 2007
Room: Jupiter I

Chairs: Li Bai
Mingchih Chen

Abstracts: See page 92

- **Development of Integrated Model for Assessment of Operational Risks in Rail Track**
Gopinath Chattopadhyay¹, Venkatarami Reddy²
¹Central Queensland University, Australia
²GHD Pty Ltd, Australia
- **Definition and Evaluation of Degree of Maintenance for Multi-unit Systems**
Renyan Jiang¹, Guanhua Qin¹
¹Changsha University of Science & Technology, China
- **A Combined Multivariate Technique and Multi Criteria Decision Making to Maintenance Strategy Selection**
Mohammad Saeed Zaeri¹, Jamal Shahrabi², Mahmood Pariazar², Arash Morabbi³
¹Member of Young Researchers Club, Islamic Azad University, Iran
²Amirkabir University of Technology, Iran
³Islamic Azad University, Iran
- **Optimal Spare Ordering Policy For Preventive Replacement With Age-Dependent Minimal Repair Under Cost Effectiveness Criterion**
Jih-An Chen¹, Yu-Hung Chien²
¹Kao-Yuan University, Taiwan
²National Taichung Institute of Technology, Taiwan
- **Effects of Preventive Maintenance on the Reliability of Production Lines**
Lin Ma¹, Yong Sun¹, Joseph Mathew¹
¹Queensland University of Technology, Australia
- **Optimal Age-Replacement Model with Minimal Repair Based on Cumulative Repair Cost Limit and Random Lead Time**
Yu-Hung Chien¹, Jih-An Chen²
¹National Taichung Institute of Technology, Taiwan
²Kao-Yuan University, Taiwan

Maintenance Modeling and Engineering (2)

Session H (11:00 - 12:30)
Wednesday - December 5, 2007
Room: Jupiter I

Chairs: Yu-Hung Chien
Renyan Jiang

Abstracts: See page 93

- **Sensitivity Analysis for the Optimal Minimal Repair/Replacement Policies under the Framework of Markov Decision Process**
Mingchih Chen¹, Chun-Yuan Cheng¹
¹Chaoyang University of Technology, Taiwan
- **Testing Strategies for Parallel-Series Standby Systems**
Min Wang¹
¹Chaoyang University of Technology, Taiwan
- **The Optimal Periodic Preventive Maintenance Policy with Degradation Rate Reduction under Reliability Limit**
Chun-Yuan Cheng¹, Mingchih Chen¹, Renkuan Guo²
¹Chaoyang University of Technology, Taiwan
²University of Cape Town, South Africa
- **Entoropy Model with Application to Maintenance Policy**
Toshio Nakagawa¹, Syouji Nakamura²
¹Aichi Institute of Technology, Japan
²Kinjo Gakuin University, Japan
- **Nonlinear Programming Solution for Optimum PM Schedule of Auxiliary Components**
Salman Al-Mishari¹, Saad M. A. Suliman²
¹Saudi Aramco, Saudi Arabia
²University of Bahrain, Bahrain
- **Survivability Analysis of Reconfigurable Systems**
Li Bai¹, Saroj Biswas¹, Albert Ortiz², Frank Ferrese², Don Dalessandro², Qing Dong²
¹Temple University, United States
²Department of the Navy, United States

Information Engineering (1)

Session G (09:00 - 10:30)
Wednesday - December 5, 2007
Room: Jupiter II

Chairs: Masahiro Aruga
Hsien-Jung Wu

Abstracts: See page 94

- **A Framework for Measuring Value in Business Interoperability**
Antonio Grilo¹, Ricardo Jardim-Goncalves², Virgilio Cruz-Machado¹
¹UNIDEMI, FCT-UNL, Portugal
²UNINOVA, FCT-UNL, Portugal
- **Multidimensional Data Mining of Association Patterns in various Granularities for Healthcare Service Portfolio Management**
Johannes K. Chiang¹
¹MIS, National Chengchi University, Taiwan
- **The Conceptual Model of Virtual Enterprise Business Strategy in Hyper-Competition Environment**
Sayed Sajjad Moravveji¹, Ali Abdollahi², Neda Eghbali³
¹Payam Nour University, Iran
²Iran Telecom Research Center(ITRC)/Shahid Beheshti University, Iran
³Shahed University, Iran
- **Incremental Mining and Re-mining of Frequent Patterns without Storage of Intermediate Patterns**
Fan-Chen Tseng¹
¹Kainan University, Taiwan
- **Spatial Credibilistic Clustering Algorithm in Noise Image Segmentation**
Peihan Wen¹, Li Zheng¹, Jian Zhou¹
¹Tsinghua University, China
- **An Effective Particle Swarm Optimization Method for Data Clustering**
I-Wei Kao¹, Chi-Yang Tsai¹, Yi-Chen Wang¹
¹Yuan Ze University, Taiwan

Information Engineering (2)

Session H (11:00 - 12:30)
Wednesday - December 5, 2007
Room: Jupiter II

Chairs: Antonio Grilo
Johannes K. Chiang

Abstracts: See page 95

- **An Augmented RBAC Structure for Collaborative Software Development**
Hsien-Jung Wu¹, C. H. Sun¹, Bo-Da Lin¹
¹Asia University, Taiwan
- **Design Process Reuse Based on Genetic Engineering**
Shurong Tong¹, Bo Li¹, Keqin Wang¹
¹Northwestern Polytechnical University, China
- **A Consideration of Information Content on the Basis of Semiotics Taking Account of Virtual Reality**
Masahiro Aruga¹, Akira Egawa², Takashi Takeda¹, Hiroshi Egawa¹, Shuichiro Ono¹
¹Tokai University, Japan
²Nihon University, Japan
- **Key Techniques about the Process Integration for Product Design**
Bo Zhao¹, Yan Yan¹, Ruxin Ning¹, Xu Zhang¹, Lichen Hu², Jianjun Lin²
¹Beijing Institute of Technology, China
²China North Vehicle Research Institute, China
- **Research on Integration Platform Based on PDM for Networked Manufacturing**
Xiaojun Meng¹, Ruxin Ning¹, Xu Zhang¹, Yu Song¹
¹Beijing Institute of Technology, China
- **An Object-Based, Attribute-Oriented Approach for Software Change Impact Analysis**
Chung-Yang Chen¹, Cheung-Wo She², Jia-Da Tang³
¹National Central University, Taiwan
²CyberLink Corp, Taiwan
³Chang Gung University, Taiwan

Intelligent Manufacturing

Session G (09:00 - 10:30)
Wednesday - December 5, 2007
Room: Jupiter III

Chairs: Tung-Hsu (Tony) Hou
Yiping Lu

Abstracts: See page 96

- **A Fuzzy Data-Driven and Rule-Based Reasoning System for Setting the Nano-Particle Milling Process Parameters**
Tung-Hsu Hou¹, Chi-Hung Su²
¹National Yunlin University of Science & Technology, Taiwan
²Chihlee Institute of Technology, Taiwan
- **Recognition of Semiconductor Defect Patterns Using Spectral Clustering**
Chih-Hsuan Wang¹
¹Ming Chuan University, Taiwan
- **Modeling the Valuation Process of Silicon Intellectual Property in the Semiconductor Industry**
Chia-Liang Hung¹, Yea-Huey Su², Alfred Li-Pin Cheng³
¹National Chi Nan University, Taiwan
²National Central University, Taiwan
³National Chiao-Tung University, Taiwan
- **Control of Roundness on Turned Cylindrical Bars using Artificial Neural Network**
Preetam Kalos¹, Keshav Nandurkar¹, L. G. Navale²
¹K.K.Wagh IEE & Research, India
²Modern Education Society's College Of Engg, India
- **Assistance Ontology of Quality Control for Enterprise Model Using Data Mining**
Xuhui Chen¹, Jun Lu¹, Zhongyuan Liu¹
¹Lanzhou University of Technology, China
- **Comparison of Two Flow Analysis Software for Injection Moulding Tool Design**
Iwan Halim Sahputra¹
¹Petra Christian University, Indonesia

Design Chain Management

Session H (11:00 - 12:30)
Wednesday - December 5, 2007
Room: Jupiter III

Chairs: Chih-Hsing Chu
Roger Jiao

Abstracts: See page 97

- **Business Model Innovation through Collaborative Product Development: A Case Study of Design Services in Taiwan**
Chih-Hsing Chu¹, Han-Chung Cheng¹
¹National Tsing Hua University, Taiwan
- **Product Design with Consideration of Contingent Costs: A Design Function and Variation Risk Management Perspective**
Chun-Ying Shen¹, Jung-Wei Sun²,
Yu-Jing Lin², Shuo-Yan Chou²
¹Ching Yun University, Taiwan
²National Taiwan University of Science & Technology, Taiwan
- **A Simple Multi-Objective Optimization Approach for Material Purchasing Problem of a Railway Transportation Business**
Yiping Lu¹, Jianzhong Cha¹, Yingshuai Zhao¹, Jingjuan Meng¹
¹Beijing Jiaotong University, China
- **A Study on Modular Design Representation**
Yuan-Ping Luh¹, Chih-Chin Pan¹,
Jian-Wei Su¹
¹National Taipei University of Technology, Taiwan
- **An Approach to Improve the Efficiency of Configurators**
Yue Wang¹, Mitchell Tseng¹
¹Hong Kong University of Science & Technology, Hong Kong
- **A Case Study of Obsolete Part Procurement Process Reengineering**
Jun Du¹, Yuan-Yuan Jiao², Roger Jiao³,
Arun Kumar³
¹Tianjin University, China
²Nankai University, China
³Nanyang Technological University, Singapore

Production Planning and Control (2)

Session G (09:00 - 10:30)
Wednesday - December 5, 2007
Room: VIP

Chairs: Reza Tavakkoli-Moghaddam
Loo Hay Lee

Abstracts: See page 98

- **A New Hybrid Intelligent Method for Assembly Line Balancing**
Supaporn Suwannarongsri¹, Sunpasit Limnararat¹, Deacha Puangdownreong²
¹King Mongkut's Institute of Technology Ladkrabang, Thailand
²South-East Asia University, Thailand
- **The Use of a Memetic Algorithm in Operations Scheduling of Cellular Manufacturing Systems with Makespan**
Reza Tavakkoli-Moghaddam¹, Ahmad Ali Bozorgzad², Yousef Gholipour Kanani²
¹University of Tehran, Iran
²Islamic Azad University, Iran
- **A Method of Reducing Complexity of Product Based on TRIZ**
Fang Liu¹, Runhua Tan¹, Peng Zhang¹
¹Hebei University of Technology, China
- **Automatic Seasonal Auto Regressive Moving Average Models and Unit Root Test Detection**
Siana Halim¹, Indriati N. Bisono¹,
Melissa¹, C. Thia¹
¹Petra Christian University, Indonesia
- **Do Inventory Management Practices affect Economic Performance? An Empirical Evaluation of the Machine Tool SMEs in Bangalore**
Rajeev N¹
¹Indian Institute of Science, India
- **A New Demand Forecasting Paradigm 'Customer-Centric Individual Demand Forecasting'**
Zhongjun Tang¹, Xiaohong Chen¹
¹Central South University, China

Advanced Planning and SCM in Process Industry

Session H (11:00 - 12:30)
Wednesday - December 5, 2007
Room: VIP

Chairs: Hans-Otto Guenther
Norbert Trautmann

Abstracts: See page 99

- **A MIP/RCPSP Decomposition Approach to Short-Term Planning in Chemical Batch Production with Non-Identical Parallel Processing Units**
Norbert Trautmann¹, Rafael Fink²,
Hanno Sagebiel², Christoph Schwindt²
¹University of Bern, Switzerland
²Clausthal University of Technology, Germany
- **A Priority-Rule Based Method for Scheduling in Chemical Batch Production**
Christoph Schwindt¹, Rafael Fink¹,
Norbert Trautmann²
¹Clausthal University of Technology, Germany
²University of Bern, Switzerland
- **Network-wide Campaign Planning for Multi-stage Processes in the Chemical Industry**
Markus Meiler¹, Hans-Otto Guenther¹,
Martin Grunow²
¹Technical University Berlin, Germany
²Technical University of Denmark, Denmark
- **An MILP Model Application for Supply Network Planning in the Production of Chemical Commodities**
Hans-Otto Guenther¹, Matthias Kannegiesser¹
¹Technical University Berlin, Germany
- **Application of Analytical Network Process on Supplier Selection to Hazardous Substance Management in Green Supply Chain Management**
Chia-Wei Hsu¹, Allen Hu¹
¹National Taipei University of Technology, Taiwan
- **Research on Information Increment and Demand Information Value in Supply Chains**
Jing Wang¹, Yuxiang Li², Xun Wang²
¹BeiHang University, China
²Tsinghua University, China

Poster Session

Date: 5 Dec 2007 Wednesday
09:00 - 11:30 (Poster on Display)
10:30 - 11:00 (Interactive Session)

Room: Venus III

- 1
p. 100 **The Analysis and the solving of Local Protectionism in Passenger Transportation between adjacent cities Based on Game Theory**
Yun Chen¹, Wei Tang¹
¹Changsha University of Science & Technology, China
- 2
p. 100 **Application of Grey Programming in Irregular Flight Scheduling**
XiuLi Zhao¹, JinFu Zhu¹, Mei Guo¹
¹Nanjing University of Aeronautics & Astronautics, China
- 3
p. 100 **Predicting Movement Directions of Stock Index Futures by Support Vector Models with Data Preprocessing**
Ping-Feng Pai¹, Wan-Ru Wei¹
¹National Chi Nan University, Taiwan
- 4
p. 100 **Research on Key Strategic Factors of Chinese Coal Enterprises' Sustainable Development**
Yi-fei Weng¹
¹China University of Mining Technology (Beijing), China
- 5
p. 100 **A New Method for Huge Group Decision-making**
Rong Liu¹, Xiaohong Chen²
¹Changsha University of Science & Technology, China
²Central South University, China
- 6
p. 100 **A Model of Manufacturing Quality Information Supporting Design**
Xianlong Xu¹, Shurong Tong¹
¹Northwestern Polytechnical University, China
- 7
p. 100 **The Use of Fuzzy Analytic Hierarchy Process to Confer the Core Factors of 3G Mobile Telecommunications' Content Use**
Yu-Lung Wu¹, Michael C.S Chang², Pei-Chi Yang²
¹I-Shou University, Taiwan
²I-shou University, Taiwan
- 8
p. 100 **Assessment on the Enterprise's Operational Performance Using Multiple Attribute Decision Making**
Chuan-Chun Wu¹, Yu-Lung Wu², Pei-Chi Yang¹
¹I-shou University, Taiwan
²I-Shou University, Taiwan
- 9
p. 101 **A New Financial Engineering Model for Analyzing the Royalty of BOT Projects: The Taiwan Case**
Chao-Chung Kang¹, Cheng-Min Feng², Szu-Chi Huang³
¹Providence University, Taiwan
²National Chiao Tung University, Taiwan
³Taiwan University, Taiwan

- 10
p. 101 **A Methodology to Determine the Cost of Spare Part for Choosing the Best Mode of Shipment**
Dariush Tavaghof Gigloo¹, Mohammad Ali Shafia¹
¹Iran University of Science & Technology, Iran
- 11
p. 101 **Study of Construction Bidding System Based on Combination of Rough Set Theory and Back-propagation Network**
Xueqing Wang¹, Gang Yu¹, Hui Zhao¹
¹Tianjin University, China
- 12
p. 101 **Forecasting Electricity Consumption by Separating the Periodic Variable and Decompositions the Pattern**
Farid Ghaderi¹, Ali Azadeh¹, Hamid Reza Sadeghi Keyno¹
¹University of Tehran, Iran
- 13
p. 101 **Case Study of Picking Method Selection for Cosmetic Broken-case Picking Operation**
Jinping Liu¹
¹Dalian Maritime University, China
- 14
p. 101 **Single-Machine Scheduling to Minimize the Number of Early Jobs**
Rong-Hwa Huang¹, Chang-Lin Yang¹
¹Fu Jen Catholic University, Taiwan
- 15
p. 101 **An Inventory Model with -Rational Type- Backlogged Demand Rate and Quadratic Backlogging Cost**
Joaquin Sicilia-Rodriguez¹, Luis-Augusto San-José², Juan Garcia-Laguna²
¹Universidad de La Laguna, Spain
²Universidad de Valladolid, Spain
- 16
p. 101 **Use Genetic Algorithm in Production and Inventory Strategy**
Cheng-I Hou¹, Chih-Yao Lo¹, Jai-Houng Leu¹
¹Yu-Da College of Business, Taiwan
- 17
p. 102 **A Composite Weighted Multi-objective Optimal Approach for Emergency Logistics Distribution**
Ming Liu¹, Lindu Zhao¹
¹Southeast University, China
- 18
p. 102 **Scheduling Performance Evaluation in Hybrid Production Environments**
Wen-Pai Wang¹
¹National Chin-Yi University of Technology, Taiwan
- 19
p. 102 **Scheduling Multiple Orders with Preemptive Jobs and Resource Dependence Times**
Shan-Ping Chuang¹, Tsung-Shin Hsu¹, Chang-Lin Yang²
¹National Taiwan University of Science & Technology, Taiwan
²Fu Jen Catholic University, Taiwan
- 20
p. 102 **Optimum Production Planning Model under Probabilistic Market Demand**
Tian-Syung Lan¹, Chih-Yao Lo¹, Jian-Lun Deng¹
¹Yu-Da College of Business, Taiwan

- 21
p. 102 **Manpower Allocation in an Asynchronous Production Line with Leveled Labor**
Kuang-Yao Wu¹, Hong-Feng Lai¹, Chung-Yen Ho¹
¹National United University, Taiwan
- 22
p. 102 **A Study of the EPQ Model Using Fuzzy AHP When Fflaw of the Products or Unreliable Machineries Exists**
Chih-Yao Lo¹, Jai-Houng Leu¹, Cheng-I Hou¹
¹Yu-Da College of Business, Taiwan
- 23
p. 102 **A New Process Capability Index under Multiplicative Adjustment of Process Mean and Its Demonstration Procedures**
Kwanwoo Kim¹, Bong-Jin Yum¹
¹Korea Advanced Institute of Science Technology, South Korea
- 24
p. 103 **The Impact of ERP Implementation on Corporate Supply Chain Performance**
Jia-Jane Shuai¹, Yi-Fen Su², Chyan Yang²
¹Ming-Hsin University of Science & Technology, Taiwan
²National Chiao Tung University, Taiwan
- 25
p. 103 **A Multi-period Ordering Policy in Supply Chain**
Chun-Chin Wei¹, L. T. Chen²
¹Ching Yun University, Taiwan
²National Pingtung Institute of Commerce, Taiwan
- 26
p. 103 **Identifying Efficient Cane Growers and Exploiting Their Expertise in Improving Inefficient Ones**
Kullapapruk Piewthongngam¹, Jakrapan Suksawat¹, Arunwadee Tenglolai²
¹Khon Kaen University, Thailand
²Mitr Phol Sugarcane Research Center, Thailand
- 27
p. 103 **Research on Supply Chain Disruption Coordination Mechanisms under Algebraic Demand and Asymmetric Information**
Pin Zhuang¹, Lindu Zhao²
¹Southeast University, Nanjing
²University of Aeronautics and Astronautics, China
²Southeast University, China
- 28
p. 103 **Decision-making for the Optimal Number of Suppliers Considering Trade-off between Supplier Management Cost and Supply Failure Risk**
Dan Wang¹, Yuan Zhao¹
¹Dalian Maritime University, China
- 29
p. 103 **Optimal Pricing Strategy for Queuing Systems with Balking Loss and Reneging Loss**
Pen-Yuan Liao¹, Leewen Tyan²
¹National United University, Taiwan
²Ta-Hwa Institute of Technology, Taiwan

- 30
p. 103 **A Case Study of Applying Spectral Clustering Technique in the Value Analysis of An Outfitter's Customer Database**
En-Chi Chang¹, Shian-Chang Huang¹, Hsin-Hung Wu¹, Chiao-Fang Lo¹
¹National Changhua University of Education, Taiwan
- 31
p. 103 **The Business Model of Internet Application Services for Telecommunications Operators**
Peishan Lin¹, Muhammad Khalil Shahid¹, Shoulian Tang¹
¹Beijing University of Posts & Telecommunications, China
- 32
p. 104 **Finite Element Method Modeling and Analysis for Aeronautic Synchronous Generator with Damper Windings on Unloading and Short-Circuit Conditions**
Xiaohe Ma¹, Songhua Shen¹, Luyan Bi¹, Jianfeng Li²
¹BeiHang University, China
²Motorola Electronic Pte. Ltd, Singapore
- 33
p. 104 **A Simulation Model of Bullwhip Effect in a Multi-Stage Supply Chain**
Pilada Wangphanich¹, Sami Kara¹, A/Prof Berman Kayis¹
¹University of New South Wales, Australia
- 34
p. 104 **A Planning Support System For System Of Systems Engineering**
Yong Wang¹, Zhong Liu¹, Weiming Zhang¹, Jincal Huang¹, Baoxin Xiu¹
¹National University of Defense Technology, China
- 35
p. 104 **Modeling and Verifying Web Service Composition Using Colored Petri Nets Based On WSCI**
Xinguo Deng¹, Ziyu Lin¹, Weiqing Cheng¹, Ruliang Xiao¹, Ling Li¹, Lina Fang¹
¹Wuhan University, China
- 36
p. 104 **Development of Surface Roughness Prediction Model Using Response Surface Methodology in High Speed End Milling of AISI H13 Tool Steel**
Abdullah Mohd. Khalid Hafiz¹, AKM Nurul Amin¹, A N Mustafizul Karim¹, M. Amri Lajis²
¹International Islamic University Malaysia, Malaysia
²Universiti Tun Hussein Onn Malaysia, Malaysia
- 37
p. 104 **Knowledge Access Control Policy Language Model for Virtual Enterprises**
Tsung-Yi Chen¹, Yuh-Min Chen², Hui-Chuan Chu³, Chui-Cheng Chen⁴
¹NanHua University, Taiwan
²National Cheng Kung University, Taiwan
³National University of Tainan, Taiwan
⁴Southern Taiwan University of Technology, Taiwan
- 38
p. 104 **The Research Status of Complex System Integrated Health Management System(CSIHM) Architecture**
Yi-bo Li¹, Bing Li¹, Sen-yue Zhang¹, Yun-hong Gao¹
¹Shenyang Institute of Aeronautical Engineering, China
- 39
p. 105 **The Limitations of the Technology Roadmap and Importance of New Management Tools in Science-based Innovation: the Case of Nanotechnology in Japan**
Daisuke Kanama¹, Akio Kondo¹
¹National Institute of Science & Technology Policy, Japan
- 40
p. 105 **Knowledge Management Approach in Mobile Software System Testing**
Kein Wei Ong¹, Mei Ying Tang¹
¹Motorola Software Group, Malaysia
- 41
p. 105 **Knowledge Sharing and KM Effectiveness in Technology R&D Teams: Transactive Memory System and Team-based Outcome Expectations Perspectives**
Chi-Cheng Huang¹, Tzu-Jung Huang¹
¹Aletheia University, Taiwan
- 42
p. 105 **Disruptive Process Innovation in Semiconductor Industry**
Srikanth Narasimalu¹, C C Hang¹, Kah-Hin Chai¹
¹National University of Singapore, Singapore
- 43
p. 105 **Binomial Distribution Based Approach to Deriving Time Series Weights**
Z. S. Xu¹, J Chen¹
¹Tsinghua University, China
- 44
p.105 **Applying Critical Chain in Project Scheduling and Estimating Buffer Size Based on Fuzzy Technique**
Kun Li¹, Yun-xiang Chen¹
¹Institute of Engineering, Air Force Engineering, China

ABSTRACTS

Session	A (11:00 - 12:30)
Topic	Technology and Knowledge Management (1)
Date	Monday - December 3, 2007
Room	Venus I
Chairs	Tritos Laosirihongthong and Kah-Hin Chai

Disruptive Innovations and the Greying Market

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¹German Institute for Japanese Studies, Japan

²National University of Singapore, Singapore

The current shift in demographics – aging and shrinking populations – in many countries around the world presents a major challenge to companies and societies alike. One particularly essential implication is the emergence and continuing growth of the so-called “greying market” or “silver market”. Building on Christensen’s disruptive innovation framework, this paper discusses how these innovations could be leveraged to benefit both businesses and customers in the greying market. It offers four important propositions in this context as well as essential issues for future research.

The Matching between Types of Knowledge and Organizational Learning Styles and the Transformation of the Relationship in the Process from Imitation to Innovation

Xiao Zhang¹, Fan Feng¹, Jia Li¹

¹Nanjing University, China

Generally, enterprises lagging in technology begin their endeavor to narrow the gap between their technology and that of technologically advanced enterprises with imitation. As the gap is constantly narrowed, those enterprises with backward technology but extraordinary learning capacity will experience the catching-up process from pure imitation to creative imitation, and then from partial innovation to independent innovation. As technology gap between enterprises is mainly caused by their knowledge gap, acquiring knowledge, core technological knowledge in particular, is the key to bridging technology gap. And organizational learning is an important means to the end of knowledge acquisition, application and dissemination. Due to the characteristics of knowledge, different stages from imitation to innovation will have different learning focuses, which requires that different organizational learning styles should adapt to the target knowledge as so to ensure effective acquisition, assimilation and application of knowledge. As the enterprise advances from one stage to another and its target knowledge changes, organizational learning styles should be adjusted correspondingly.

Networking, Absorptive Capacity, Science Parks ~ A Proposed Conceptual Model for Firm Innovative Performance

Kai-Ying Chan¹, Tinus Pretorius¹

¹University of Pretoria, South Africa

This paper elaborates on current literature on science parks, focusing on how networking and absorptive capacity affect firm innovative performance. To fulfill the purpose of providing a systematic literature review, selections of existing empirical studies and literature studies have been organized on the basis of the following three dimensions: (1) science parks; (2) networks; and (3) absorptive capacity. In the proposed conceptual model, networking is broken down into formal and informal networks, which are defined further in terms of relational embeddedness and structural embeddedness. Absorptive capacity is included in the model to account for firm-specific factors influencing innovativeness. The reason is that absorptive capacity influences firm ability to translate information from the networks into its own innovation activities. Science parks, closely associated with cluster structures, also have an influence on firm innovative performance due to geographic proximity where common knowledge is augmented and reinforced. This paper shows the importance of examining science park effects in greater detail, clearly showing networking, absorptive capacity and cluster mechanisms that drive firm innovative performance.

Construction of an Automatic Inspection System with Capability of Identifying Color Characteristics of Product

Chiao Tzu Huang¹, Ching-Jen Huang¹, Wei-Ling Wang¹

¹National Chin-Yi University of Technology, Taiwan

There are many products are qualified by the color quality characteristics, such as color of textile, color of painting on objects and so on. In general, how to inspect the product is based on the inspectors’ eyes. Although the inspectors follow the standard inspection procedure and have the standard color sample for inspection, there are still a minor discrepancy occurred each time because of fatigue and illumination change. The result is customers claim to rejection. It will directly affect the profit of company. In this research, based on the inspection of machine vision we want to construct an automatic inspection system to identify color characteristics of product on LabVIEW platform. In the system, image of retrieved area will be grabbed under a steady light environment and this will be digitized into gray level. Then the contour of gray level will be used as an edge. For color identification purpose, further processed image will compare with the color sample database. Finally accept or reject is dependent on the threshold we define. Through the system we constructed, it will reduce the possibility of misjudgment made by inspectors’ eyes, upgrade the color quality characteristics level of product, speed-up identification, increase the yield rate of product, and reduce the labor cost.

Vertically Integrated Market Structure of Communications Industry and Future Horizontal Market Structure

Muhammad Khalil Shahid¹, Jie Ren¹, Shoulian Tang¹

¹Beijing University of Posts & Telecommunications, China

Technological advancements and innovations have changed the market and services structure of communications industry drastically. Due to technological innovations and customer demands, boundary lines between telecommunications, information and media industries have blurred to a point that it is becoming difficult to distinguish between telecom, information and media services. The traditional vertically integrated networks are being deconstructed and are being transformed into horizontally interconnected function layers. The market structure is becoming more and more vertically integrated but technological advancements are dragging the markets towards more horizontally integrated value chain structures and clearly indicating the need for vertical disintegration of this market. This paper analyses the recent trends and structure of vertically integrated communication industry and also discusses the future horizontally integrated value chain structure and future horizontally integrated structural layout of carriers. In future networks, services will be offered on the basis of an integrated access platform and will no longer be dependent on a specific individual access technology. The main players will have to restructure themselves into horizontally separated areas of Networks, Services and Sales to survive and to grow and will also have to focus on one of the areas where they have competitive edge.

Vertical Disintegration and Entrepreneurial Opportunities: An Historic Analysis of the Broadcasting Sector

Jeffrey Funk¹

¹National University of Singapore, Singapore

This paper presents a modified version of the product life cycle model in order to address how vertical disintegration emerges and how vertical disintegration provides entrepreneurial opportunities. It does this by redefining the concept of a dominant design as a set of multiple design decisions that include both alternative choices about technology and the definition of sub-problems in terms of independent modules. The degree of openness in the design rules that define the interactions between these modules determines the degree of independence for these modules and thus the level of opportunities for vertical disintegration and entrepreneurs. This paper uses historical analyses of the broadcasting sector to define these vertically disintegrated layers and the rules that determine the interactions between these layers. It uses data on the number of firms and revenues in each layer to show how the emergence of independent modules and vertical disintegration has led to entrepreneurial opportunities.

Session	B (13:30 - 15:00)
Topic	Technology and Knowledge Management (2)
Date	Monday - December 3, 2007
Room	Venus I
Chairs	Shann-Bin Chang and Kai-Ying Chan

Selling New Technologies; Making a Convincing Business Case

Marcel Dissel¹, David Probert¹, Lüder Tockenbürger²

¹University of Cambridge, United Kingdom

²Steinbeis Hochschule Berlin, Germany

Convincing someone to invest in new technologies is one of the most important tasks of technology management and arguably also the most uncertain. Despite the fact that technology managers having a wide range of methods and tools at their disposal to value technologies, the actual process of getting the buy-in and subsequent funds of the board, business units, or external customer is often an unsatisfactory process. In fact very little has been written on the sales process for new technologies. This paper argues that to complement this gap technology managers can learn from existing sales practices and processes by applying consultative sales concepts. The paper reports on an ongoing study and reviews literature on current technology development processes and identifies 2 key issues. Firstly, there appears to be a disconnection in the communication between seller and buyer. Secondly, the seller has a different (often technologically driven) perspective on the new technology whereas the buyers are more interested in the application and user perspective. This notion is supported using two illustrative cases in the automotive and aerospace industry. The paper concludes by proposing one way of integrating a consultative sales approach for new technologies.

Knowledge Creation and Diffusion in Innovation Networks by System Viewpoint

Dian Yan Liou¹, Justin D. Liou²

¹Yu Da College of Business, Taiwan

²The Pennsylvania State University, United States

In the knowledge-based economy, firms are continually searching for ways to promote inter-firm interactive learning and for outside partners and networks to provide complementary assets. As they develop new products and processes, firms determine which activities they will undertake individually; in collaboration with other firms; in collaboration with universities or research institutions; and with the support of government. Although the arguments presented are well known in the field and a wide body of literature already exists that addresses these topics, the paper derives better model to understand network formation in a knowledge cluster by using causal-loop diagrams to present the mainly hypothetical relationships of various factors related to knowledge creation and diffusion. The paper does not provide any empirical support for the presented model, but the authors stress this work as being exploratory and generic.

Service Innovation Efficiency Evaluation on Non-life Insurance Industry in Taiwan

Chin-Huang Lin¹, Ho-Li Yang², Dian Yan Liou³

¹Chung Hua University, Taiwan

²Chung Hua University, National United University, Taiwan

³Yu Da College of Business, Taiwan

Service innovation plays an increasingly significant role in insurance industry. Non-life insurance companies' managers need to develop a convenient channel prior to the addition of new insurance products. E-commerce is one approach of service innovation which will enable managers to select innovative offerings that are most beneficial to the firm and that will truly have an impact on customer's choices. This study analyzes empirically the performance or efficiency change of the non-life insurance companies with and without e-commerce in Taiwan. Data envelopment analysis (DEA) is used as the research tool in this study which finds that the efficiency has not significantly improved when e-commerce applied. To improve efficiency in innovative service performance, most of companies should strive for promoting premium from various insurance items and some companies should reduce the number of employee to improve efficiency.

Determinants of Job Satisfaction in the IT Industry

Fethi Calisir¹, Cigdem Altin Gumussoy¹

¹Istanbul Technical University, Turkey

Firm performance increases as workers' job satisfaction increases. Therefore, firms have a great interest in identifying the determinants of job satisfaction. To this end, this study conducts a survey to investigate the impact of IT professionals' demographic characteristics, work characteristics and work stress on job satisfaction. Five components of job satisfaction were revealed by principal component analysis, and variables affecting each job satisfaction component were determined by regression analysis.

An Empirical Investigation of the Knowledge Management Strategic Alignment Model

Yue-Yang Chen¹, Hui-Ling Huang², Tsai-Pei Liu³

¹I-Shou University, Taiwan

²Shu-Te University, Taiwan

³Kao Fong College, Taiwan

Knowledge has been regarded as an important strategic resource in organizations, it is necessary to know about how to manage and integrate various kinds of resources effectively that are bested to knowledge management. Recently, the importance of the information technology (IT) for effective KM activities has been indicated. The match of IT and KM is an important concern for executives. However, their high-high fit doesn't always yield positive organizational outcome since enough exceptions indicated that business strategy and knowledge strategy, as well as human resource management strategy are interdependent that must be integrated as a whole. Drawing on the concept of strategic alignment, this study proposed a KM strategic alignment model (KMSAM) within which business strategy, HRM strategy, KM strategy, and IT strategy are coexisted. Empirical data for hypotheses testing are collected from top ranked companies in Taiwan; yielding 161 valid samples. Performance implications of Strategic alignment are examined using covariation approaches. The results indicate that strategic alignment among these four strategies is contribution to business performance.

Knowledge Management System Architecture for Industry Cluster

Pradorn Sureephong¹, Nopasit Chakpitak¹, Yacine Ouzrout², Gilles Neubert², Abdelaziz Bouras²

¹Chiang Mai University, Thailand

²University Lumiere Lyon2, France

Since the concept of the industry cluster was popularized by Porter in 1990, many countries try to improve the competitiveness of through industry sector. Not only companies who take part in the cluster but also academic institutes, government agencies, associations, and supportive industries. The more actors involved in the cluster the more knowledge were distributed among the member of cluster. Although, many literatures about cluster explained how knowledge is important for the cluster development. But, there is no specific knowledge management methodology or system for the cluster. This study is concerned about knowledge exchange in the cluster by using knowledge engineering methodology to analyze, model and design Knowledge Management System (KMS). At the end of this study, we will implement KMS in handicraft cluster in Thailand as our case study. As we are in the beginning of the study, this paper proposed methodology and primary result from knowledge engineering. Then the KMS architecture was proposed as the result of study in this paper.

Session	C (15:30 - 17:30)
Topic	Technology and Knowledge Management (3)
Date	Monday - December 3, 2007
Room	Venus I
Chairs	Marcel Dissel and Leon Pretorius

Research on Rapid Design Process Model of Large-scale valve for Product Innovation

Xiang-dong Li¹, Runhua Tan¹, Lixiao Geng¹, Bojun Yang¹
¹Hebei University of Technology, China

Product innovation is an important means to compete for markets for enterprises during the era of mass customization. Manufacturing enterprises pay more attention to the innovation ability in product design and development field. The objective of this research is to solve rapid innovation design questions of the large-scale valve through establishing rapid design process model based on product platform. At the same time, the model is used in the actual product innovation design process. Combining with actual circumstances of a large-scale valve enterprise in China, rapid design process model based on the platform strategy is proposed. It includes three parts: platform establishing process, configuration resources database constructing process and platform applying process. Platform establishing process accomplishes constructing process of product platform. Configuration resources database constructing process is to program platform's product family according to platform configuration model of valve products and store correlative information of valve products. Platform applying process is a rapid design process according to the customers' customized demands. Moreover, key technologies based on the rapid design process model are analyzed. Prototype system and factual application example is addressed.

Information Seeking Behavior of R&D Professionals in New Product Development

Bin Guo¹, Haiqiu Li¹
¹Zhejiang University, China

Information seeking behavior plays an essential role in shaping innovation performance in industrial firms. However, little research has been conducted at the individual level to investigate the information seeking behavior of R&D professionals in new product development and potential behavior differences among different professional groups. By using an individual level sample in Chinese technology intensive firms, this paper examines both frequency and width of information source use in new product development, and how task, individual, and information source characteristics would affect information seeking behavior of R&D professionals. The research results shows that task complexity and uncertainty have significant influences on both frequency and width of information source use.

Using Modified TAM to Examine the Software Engineers' Attitude on Computer Software Patents

Shu-Min Chang¹, Shann-Bin Chang²
¹Nan Kai Institute of Technology, Taiwan
²Ling Tung University, Taiwan

The nature of patent institution is to protect the inventors and accelerate the speed of innovation. It is likely to the patent of computer software. But the opinion voiced by exponents of open source is extremely opposed to patenting computer software. It is interest to the software engineers whether agree computer software patent or not. This study employs a modified technology acceptance model (TAM) to explore the perception and behavior of software engineers, and examines the relationship between perception and management behavior about patent. The findings of this study are two: 1. Most of the relations of this research model are positively significant; 2. The scales of firm and number of patents owned by firms have a significantly different effect from the above constructs. Finally, this study provides two suggestions for future study.

A Process Model for Application of TRIZ

Wenyan Zhao¹, Huangao Zhang², Ping Jiang², Runhua Tan²
¹Tianjin University & Hebei University of Technology, China
²Hebei University of Technology, China

The theory of inventive problem solving (TRIZ) is mainly applied to developing substituted technology with higher performance than current one. It usually starts from problems or forecasting. TRIZ provides several powerful tools based on knowledge for solving problems, but it lacks of a systematic programming for the application of these tools in an enterprise. This paper provides a systematic framework for the application of TRIZ, which divides the application into two levels: strategic level and tactical level. The technology maturity is used as the main criterion for casting a strategy. The Level of Solution is used as a framework for integrating tools of TRIZ. A process model is put forward as a guideline for the application of TRIZ

from views of strategy and tactics. As an illustration the process model is applied to a company for improving performance of butterfly valve.

Factors in Innovative Search Strategy for External Knowledge Sources

Jun Li¹, Xinmin Peng², Yingbo Zhou¹, Yuan Sun¹, Shuquan Ding¹
¹Zhejiang University, China
²Zhejiang Wanli University, China

This study develops and tests a conceptual model that focuses on how managerial controllable variables influence the search strategy for technological innovation. The concept of breadth and depth are two components of the openness of individual firm's external search strategies. Based on literature, the authors developed 10 research hypotheses and tested the hypotheses using the data collected from 112 manufacturing firms in China. The findings suggest that organizational resources, the richness of external knowledge, and search experience increase levels of search breadth, whereas characteristics of technology and market expectation are negatively associated with external search breadth. Characteristics of technology, market expectation and search experience are positively associated with search depth, whereas organizational resources decrease external search depth, and the influence of the richness of external knowledge on search depth is not significant.

Modelling the Efficiency of Knowledge Economies in the Asia Pacific: a DEA Approach

Hui boon Tan¹, Chee Wooi Hooy², Sardar Islam³, Alex Manzoni³
¹Universiti Putra Malaysia, Malaysia
²University of Malaya, Malaysia
³Victoria University, Australia

This paper presents measures for the performances of 12 selected Asia Pacific countries in developing knowledge-based economies (KE). The performances of the selected countries are evaluated using Data Envelopment Analysis (DEA). The results indicate that four of the emerging countries (India, Indonesia, Thailand and mainland China) are relatively inefficient in K-E development compared to the other eight which are equally efficient. The main reason for their backwardness is due to the outflow of their human capital resource to the developed countries. This seriously undermines the level of their K-E development compared to their counterparts. The results also indicate that knowledge dissemination is generally not a serious problem, except for India. However, in terms of knowledge output, knowledge dissemination becomes the weakest point for all low-scoring countries except China. Both India and China however, encounter serious obstacles in knowledge innovation and external connection.

Application-Oriented Technology Valuation: Examples from the Semiconductor Industry

Chun-Teh Lee¹, Ching-Torng Lin¹
¹Dayeh University, Taiwan

An application-oriented methodology using tear-down analysis and strategic evaluation is presented to prioritize technologies for investments. The technologies are prioritized by an assessment of their market attractiveness and organization's competitive position. Successful application of the methodology to a few leading semiconductor foundry companies has proved its usefulness. This methodology can be applied to the major semiconductor companies along the supply chain of the semiconductor industry. Though specialized for the semiconductor industry, many aspects of this methodology can be generalized for other industries that exhibit a technological flow driven by product applications.

Integration of Customer Based Features in Digital Mock-ups

Heiner Lasi¹, Henning Baars¹, Hans-Georg Kemper¹
¹Universität Stuttgart, Germany

The development and the enhancing of industrial goods require customer knowledge as a permanent input in R&D and production processes. The origin of the customer knowledge – the customer itself – usually just stays in contact with the business units marketing, sales and service. Several studies illustrate that in most industrial Small and Medium-sized Enterprises (SME) there remains an informational gap between customer oriented and product oriented business units. As a consequence valuable customer knowledge is neglected during product development. To improve this situation a concept for a solution is developed that enables businesses to utilize customer data from CRM systems in existing CAx systems. The solution utilizes feature technologies that are modified for the inclusion of customer based features. Hence, the voice of the customer can be used to enhance product development and manufacturing processes.

A proof of concept with a prototype that is built upon a standard CAD system and a standard CRM system demonstrates the feasibility of realizing the solution.

Session	A (11:00 - 12:30)
Topic	Safety and Security
Date	Monday - December 3, 2007
Room	Venus II
Chairs	Zhizhong Li and Zahid Qureshi

An Application of the Relevance Matrix Methodology in Occupational Risk Evaluation

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This paper presents an application of the Relevance Matrix Methodology in the field of health and safety at work. This application addresses organizational risk management at the workplace. The Relevance Matrix Methodology is applied to promote risk analysis and management. Its aim is risk prioritization through the determination of an organization's critical risks in various sectors. Software was developed to help and facilitate the methodological application as well as to develop simulations. We simulate various weights for several factors resulting in different levels of prioritization when using the results. A case study of this application was developed using real data from a chemical factory. We explore several possibilities for these simulations. Traditional values for the factors used do not guarantee the best prioritization. Results found show the importance of appropriate Risk Ranking and the correct determination of factors and weights used in the Relevance Matrix.

Risk Assessment of Ship Navigation Using Bayesian Learning

Shenping Hu¹, Cunqiang Cai¹, Quangen Fang¹

¹Shanghai Maritime University, China

Risk has a random uncertainty. Risks associated with a ship navigation at sea are analyzed to solve the problem of uncertainty and a developing method is applied to be feasible to work out. Based on Bayes' point estimate and Bayesian learning to estimate the traffic accidents related to ship navigation, an analysis model is established for the quantitative risk assessment (QRA) of the vessel traffic system at sea. After the analysis on occurrence likelihood of the accidents related to ship traffic, a structure on the basis of Bayesian networks is developed to obtain the QRA of their relative risks. QRA is also put forward after analyzing the features and situations of the vessel traffic system and identifying the corresponding feature including characteristics of those hazards. The risk distributions of ship navigation are described and results are presented on QRA in relation to various features by using this method. This method, verified in the cases of QRA, turns out to be feasible by the use of machine learning.

Modeling Industrial Safety: A Sociotechnical Systems Perspective

Zahid Qureshi¹, Muhammad Ashraf¹, Yousef Amer¹

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Highly technological systems such as advanced manufacturing systems, aviation, telecommunications, nuclear power plants, chemical and petroleum process industry are increasingly becoming more complex, leading to new kinds of system failures and accidents. Traditional safety modeling approaches are not suitable to analyze accidents that occur in modern sociotechnical systems, where accident causation is not the result of an individual component failure or human error. This paper discusses some traditional safety models and their limitations, and describes new system-theoretic approaches to the modeling and analysis of accidents in complex systems. This paper also discusses emerging research in cognitive systems engineering, sociological analysis, and resilience engineering for safety analysis, accident modeling and safety management of complex industrial systems.

The Effect of Competitiveness on Occupational Safety

Päivi Hämäläinen¹

¹Tampere University of Technology, Finland

Globalization has changed the occupational safety situation at country level. Work have a heavy impact on health, and work-related morbidity and mortality affect the worker and ones family, as well as increase costs for society. The gross domestic product and the World Economic Forum competitiveness index were used to explained occupational accidents and work-related diseases differ from each others in regions. Competitiveness is highest in the countries where fatality rate is the lowest. Occupational developments of work, work conditions, and work environments have an effects on productivity, working climate, safety culture, and workers commitment. These are all factors, which effect on competitiveness at company level, as well as country level.

A Comparative Study of Anti-Phishing Preparedness of Hong Kong and Singapore Banks

Indranil Bose¹, Alvin Leung¹

¹The University of Hong Kong, Hong Kong

Phishing poses a huge threat to the electronic commerce industry. Not only does it shatter the confidence of customers towards e-commerce, but also causes electronic service providers tremendous economic loss. In order to safeguard the interest of customers, both academia and industrial practitioners have proposed various anti-phishing measures and online security policies. In this paper, we investigate the banking industry, which is one of the frequent targets of phishing, of two prominent international financial hubs - Hong Kong and Singapore. Our goal is to examine how well banks are prepared against phishing by analyzing security information available on their official Web sites. The result shows that among four types of phishing attacks, banks in both places are well prepared to handle bogus Web sites but are inadequately prepared to handle phishing email. In terms of method of presentation of security information, banks in both regions generally prefer FAQs and demonstrations. Despite some similarity, it is found that some regional factors, for instance, government advocacy, plays a significant role in adoption of security measures. Through this research, we hope to give some insights to both industrial practitioners and academic researchers about preparedness of banks against phishing.

RSA-based Secure Electronic Cash Payment System

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¹Zhejiang Gongshang University, China

The wide application of E-commerce has put forward the new demands on the modes of Web payment. E-cash payment system is a key mode of current all web electronic payment. In this paper, a novel secure and convenient E-cash payment scheme is proposed based on analyzing the present technology of E-cash. This scheme is composed of three protocols, which are withdrawal protocol, payment protocol and deposit protocol. Utilizing the property of the modulus operation, this scheme could meet the demand of E-cash with only few public keys, and solve the problem of payment change by using blind signature and direct signature. At last, a prototype system is realized. The experiment result shows that proposed E-cash system is feasible.

Session	B (13:30 - 15:00)
Topic	Human Factors (1)
Date	Monday - December 3, 2007
Room	Venus II
Chairs	Bor-Shong Liu and Martin Helander

The Effect of Feedforward Training to Improve Inspector Performance

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The purpose of this research was to study the inspector performance using feedforward training with visual inspection training program. This program simulated search tasks, which were Thai characters. Defects were ก and ฅ of Thai characters and also the background characters ๐, ๑, ๒, ๓, ๔, ๕, and ๖ this was the density of background which filled about 30% of all areas of each screen. Nine subjects were randomly chosen and passed efficiency test of eyes. Training steps were divided in three levels to provide basic information, percent of defects, and location of defects, respectively. The results showed that inspector performance was improved. Search times showed significantly difference at the level of 0.01 and accuracy in defect detected showed significantly difference at the level of 0.05. This could be concluded that feedforward training affected inspector performance.

Semi-autonomous Groups Application in Brazil: A Survey-based Approach

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Purpose: to survey the application of semi-autonomous groups and teamwork in a sample of firms, searching for patterns, results achieved and theory testing using inductive statistics.

Design/methodology: an inter-sectorial sample, composed of 49 firms that recognize to adopt the concept of autonomy. A questionnaire was sent either by email or conventional mail, to determine the characteristics of the firms respondents, the deepness and span of the teams' autonomy, results achieved, etc.

Findings: positive correlation between the degree of autonomy and results associated to superior capacity of learning, flexibility, and better information flow;

Research limitations: results are limited to the sample, which was not designed to be probabilistic.

Originality/value: the instrument used to evaluate the degree of teams' autonomy has shown statistical consistency, measured by Cronbach's Alpha coefficient. The method can be replicated by other researchers at any other sample. It's also the first survey specific to the theme, in Brazil.

Construction of Online Game Addiction Based on Player Experience

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¹Tsinghua University, China

Although many researches focus on online game addiction, few of them study its formation based on players. The objective of the study is to explore the formation of online game addiction based on the players and find the factors of leading to online game addiction by empirical approaches. This study adopted a questionnaire on a website to investigate the relationship between the addiction and flow experience, behavior repetition and psychological profile among Chinese college students. After ANOVA and regression analysis, results indicate that behavior repetition is the main contribution in the course of online game adding. Then flow experience of the players is the facilitating factor. Loneliness of the players also is the latent factor. The three factors jointly result in online game addiction.

Study on Structure Dimension of Intellectual Employees' Psychological Contract in Hi-tech Companies in China

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²Zhejiang University, China

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The results indicated that it is more appropriate to describe the psychological contract of Chinese intellectual employees in Hi-tech Companies with three-dimension structure model. Based on the through review of the past research, deep conversation and advanced study, 160 intellectual employees had been investigated with the psychological contract structure questionnaire. The result of exploratory factor analysis revealed that the organization's obligation of psychological contract consisted of transaction obligation, development obligation and interpersonal obligation, while the individual's obligation consisted of rules keeping obligation, organizational identity obligation and cooperation obligation. Furthermore, the three- dimension model of intel-lectual employees psychological contract was testified in the confirmatory factor analysis. At last, the paper discussed the differences compared to others results and the meaning of the research. Moreover, this article also sets up a comprehensive motivation model with the same base, and the pro-posal to establish commitment-focused incentives. If the psy-chological contract between employees and their employers can be kept, consolidated, revised and developed all the time, the various motivation methods can be effectively integrated, and employees' innovation ability will be virtually stimulated

Influence of Control Modes and Complexity on Performance of Manual-control Spacecraft Rendezvous and Docking

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¹Tsinghua University, China

²China Astronaut Research & Training Center, China

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Spacecraft rendezvous and docking (RVD) is one of the major tasks in space flight mission. This study focused on the influence of control modes and complexity on the Chinese operator performance in manual-controlled RVD. A simulated RVD system was developed. 15 male subjects aged 23-40 participated in the experiment. Examined in the experiment were two control modes (mode A – engine control and mode B –direct control) and three task complexity levels (level 1 - one axis RVD control, level 2 – two axes RVD control, and level 3 – three axes RVD control). Conclusions from the statistical analysis on the experiment data include: Control mode A required longer operation time than mode B did; the RVD operation time increased with the increase of task complexity; under task complexity level 2, operators felt much better to finish the RVD control tasks; and subjects preferred control mode B which was conformable to their operate experience. These conclusions can be useful to the spacecraft design and astronauts training.

A Comparative Study of Musical Navigation Methods for Visually Impaired Users of GUI Systems

Qianyi Zhao¹, Song Xu¹, Zhizhong Li¹, L. Wang¹

¹Tsinghua University, China

Graphical user interface (GUI) systems were considered as obstructions for the visually impaired users since it relied too much on visual channel. Thus, various auditory stimuli combined with speech served as complementary in these systems. The purpose of this study was to compare the performance of musical stimuli (called earcons) with different constructions for communicating positional information of auditory cursors to visually impaired persons. Four different types of earcons were studied, including sequence of notes (SE), regrouped sequence of notes (R-SE), quadrant (QU), and decimal digit (DE). Twenty subjects participated in navigation of abstract coordinate locations within a graphical interface divided into 40 rows and 40 columns. Six timbres and voices were used in the construction of earcons to avoid ambiguity and confusion. Both objective and subjective criteria were adopted in evaluation of the four types of earcons. The results of ANOVA indicated that: 1) Compared with SE and QU, R-SE and DE have lower error rates; 2) With SE method, more errors occurred in the area far from origin than the area near origin, whereas error distribution was better-proportioned in R-SE, QU and DE; 3) Efficiency was much higher in QU and DE than SE and R-SE. Finally discussed in this paper are advantages and disadvantages of the four methods for navigation in GUI system for visually impaired users.

Session	C (15:30 - 17:30)
Topic	Human Factors (2)
Date	Monday - December 3, 2007
Room	Venus II
Chairs	Assed Haddad and Kay Chuan Tan

Characteristics of Speeders on Freeway Ramps

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¹St. John's University, Taiwan

A mobile recording system, with integrated laser speed gun, video from CCD-cameras, digital recorder and auxiliary battery system, was used to observe driving behavior at ramp metering of freeway. Cameras were mounted on a soft shoulder to record: traffic-light status and driving speed from laser speed gun. In addition, one of cameras with telephoto lens focused on windshield of vehicle to catch drivers' characteristics (i.e. age, gender) and vehicle type. After removal of instances of interference, 1538 driving behaviors were recorded. Binary logistic regression was used to examine the risk of speeding as a function of covariates and interaction terms. The results of analysis revealed that the major contributing factors for approaching speed were traffic-light condition, vehicle type and drivers' gender. Analysis of binary logistic regression showed that male van drivers had the greatest speeding propensity in our sample (OR = 24.36). The relative risk of speeding for traveling in passenger absence is four times higher than for passenger presence. Moreover, present results confirm that vehicle-type effects vary with traffic light condition. The results of the present study may provide meaningful information applicable to the design and operation of ramp metering system.

Mobile Search: How to Present Search Results for Older Users

Ronggang Zhou¹, Hitomi Sato², Qin Gao¹, P.L. Patrick Rau¹, Yoko Asano², Kaori Fujimura², Fan Gao¹, Harumi Saito²

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With thirty-one older participants, this study is conducted to investigate how to present search results on mobile device with aim to improve older users' mobile search performance and satisfaction, and to alleviate perceived disorientation and task workload. The focus groups section is to consider the issue of how many total number of search results should be provided for small-screen search. And with a 2 (with or without presentation of search results) × 3 (how many results should be displayed when total search results determined) factor experiment is designed to look at the users' mobile search behavior. Based on the results, some guidelines were excluded for those involved in designing approaches that are more appropriate for older users' using small screen contexts.

A Study Of the Consistence of Subjective Rating for Icon-Background Color Combinations for Small Computer Icons

Shih-Miao Huang¹

¹National Formosa University, Taiwan

The color combination suggestions deducted from the single average of user preference scores might not be appropriate because different people might prefer different color combinations. Therefore, this study tried to verify that the degrees of rating consistence between subjects are various for different color combinations. The standard deviation of each color combination is calculated to judge the rating consistence between subjects for each color combination. Cluster analysis with nonhierarchical procedures is used to categorize the color combinations by the clustering variables, both standard deviations of legibility and aesthetic rating. The results showed that the degree of rating consistence between subjects was low for most color combinations because the means of standard deviations for aesthetics and legibility were higher for most color combinations. Besides, the results suggested that there are 65 color combinations which are appropriate to be used as default color combinations for skinning interfaces because these color combinations had higher rating consistence and with higher legibility and aesthetic score.

A Pilot Measurement of Head-Related Transfer Function Blur in Spatial Localization

Song Xu¹, Liang Zeng¹, Zhizhong Li¹, Changdong Tian¹, Gavriel Salvendy¹

¹Tsinghua University, China

The new concept of "HRTF Blur" is proposed in this paper to describe the uncertainty of human perception in locating a virtual sound source. From the experiment with subject's participation, it is concluded that significant HRTF Blur does exist. This paper provides a method to measure the HRTF Blur. The consistency of HRTF Blur between two measurement options (measured inwards and outwards) and among days is examined.

A Study of Morphological Influence on Head-Related Transfer Functions

Song Xu¹, Zhizhong Li¹, Liang Zeng¹, Gavriel Salvendy¹

¹Tsinghua University, China

Much effort has been put on the Head-Related Transfer Function (HRTF), which is the core technology to generate three-dimensional (3D) virtual sound. Due to the errors in sound location by non-individual HRTFs, it is necessary to produce 3D sound based on individualized HRTFs. In this paper, the morphological influence on HRTFs was studied to examine the possibility of HRTF individualization by morphological features of human body. From correlation analysis and Principle Component Analysis (PCA), it was found that morphological measurements have different effects on the magnitudes of the HRTFs at different frequencies. Some key measurements were detected to well reflect the HRTF variations.

Road Hazard Reaction Testing Using Driving Simulation: the Novice vs. the Experienced Drivers

Ying Wang¹, Peng Peng¹, Lijun Liang¹, Wei Zhang¹, Su Wu¹

¹Tsinghua University, China

It is believed that the novice drivers are less prepared for potential road hazards and their reaction mode to hazards is different from the experienced drivers. Main road hazards in China were identified using focus group discussions and questionnaires. Then virtual reality technology was used to develop five most important hazards for experimental study. In this preliminary study, two groups of Chinese drivers (8 novice and 8 experienced) were tested on a driving simulation system. Their reaction to the hazards in terms of average driving speed, braking operation against suddenly appeared hazards, and wheel steering were automatically collected and analyzed. Results indicate that experienced drivers drive slower before potential hazards and their reaction to sudden appeared hazards are more appropriate. Potential impacts of this method and result include developing interventions for novice driver training program and developing hazard warning devices.

User Perceived Quality of Online Social Information Services: From the Perspective of Knowledge Management

Yusen Dai¹, Qin Gao¹, Zao Fan¹, Ruogu Kang¹

¹Tsinghua University, China

Features of online social information services show promises for overcoming obstacles in current knowledge management practices. This paper first discussed the potential efficacy and emerging practices of such technologies in the domain of knowledge management. Then a quality model of online social information systems was derived from prior literature on online information service quality and analyses of characteristics of emerging technologies. An online questionnaire was developed and administrated to 168 users. Four quality dimensions that are perceived as important by users were identified by factor analysis and proved to be reliable: system usability, content quality, content exchangeability and accessibility, and sociability. The findings of this research provide implications for developers of both enterprise knowledge management systems and public social websites, and can facilitate future development of the instrument measuring the quality of online social service from other perspectives.

An Empirical Study on the Influencing Factors of Effectiveness of Strategic Decision-Making and Its Relation with Performance Improvement: Evidence from China

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Strategic decision-making has long been a topic of great interest in both organization theory and strategic management. This article explores the strategic decision-making. It is organized around two research questions: (1) what are the factors influencing the strategic decisions to make? And (2) Does strategic decision-making link to performance? The research proves that procedural rationality, intuition will be positively related to strategic decision making effectiveness, and while TMT conflict has the contrary effect. It also finds strategic decision making effectiveness will be positively related to performance improvement. But the hypothesis that environmental factors will be positively related to strategic decision making effectiveness does not been verified.

Session	A (11:00 - 12:30)
Topic	Supply Chain Management (1)
Date	Monday - December 3, 2007
Room	Mercury I
Chairs	D.Y. Sha and Tong Shu

Service Pricing Strategy for Third Party Logistics Corporations Implementing VMI

Lindu Zhao¹, Lei Tang¹
¹Southeast University, China

To let the service pricing strategy of third party logistics corporations satisfy each supply chain partner's "participation constraints" and "incentive-compatibility constraints", consequently promote the formation of new alliance and guarantee its stability. Applying Stackelberg game, the transfers of cost structures and the changes of profit functions in two models: manufacturer implementing VMI services model and the third party logistics corporation implementing VMI services model, are analyzed respectively, and the service pricing strategy for third party logistics corporations implementing VMI is obtained. Results of the example show that: after putting related service pricing strategy in practice, the third party logistics corporations implementing VMI can increase total profits of the supply chain; and the changes of the productions' price elasticity in final consumption market have little effects on the service pricing decision-making. The results are helpful to apply third party logistics and VMI mode widely in practice..

Supply Chain Risk Analysis with Fuzzy Cognitive Maps

Orhan Feyzioglu¹, Gulcin Buyukozkan¹, Mehmet Sakir Ersoy¹
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To achieve continuous customer satisfaction and sustain competency, a company must identify, evaluate, rank, and manage its supply chain risks. These risk factors and system components are linked in a complicated manner via direct and indirect relationships. This study suggests a systematic way of analyzing supply chain risks using a cognitive map (CM) approach. CMs have proven particularly useful for solving problems in which a number of decision variables and uncontrollable variables are causally interrelated.

Dynamic Allocation of Inventory in an RFID enabled Transportation Network

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With increased globalization, companies across the world prefer to build globally, sell globally and also source globally. In this scenario, companies would need a tool for real time visibility into all aspects of their supply chain including transportation and shipping. RFID is one such tool and the promise of RFID-enabled supply chains is that organizations will have completed, accurate, and timely end to end visibility of their supply chain. This paper tries to see what would be the value brought by RFID generated visibility in the area of transportation and shipping. We analyze a scenario where an organization, in response to a changed demand pattern, takes a corrective action by reallocating its inventory which is already en-route to a specific geographic entity, to other geographical entities. Advocates of RFID claim that, dynamic allocation of inventory (including tracing, picking, de-packing and packing etc), which is undergoing transportation can be enabled, if RFID has been implemented in the transportation/shipping network. We develop a mathematical model to evaluate the revenue generation model for the supply chain. Using simulation, we prove that such dynamic re-allocation of inventory would indeed generate higher average profits. Thus it builds a concrete case for implementation of RFID in transportation and shipping.

Selection Model and N-tier Expansion of Collaborative Credit-granting Guaranty Approaches on the Basis of AVE

Tong Shu¹, Shou Chen¹, Bart MacCarthy², Luc Muyldermans², Kin Keung Lai³, Shouyang Wang⁴
¹Hunan University, China
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Collaborative credit granting is a vital link in the operation of AVE chain and its supply chain. This paper first analyzes the measurement model of modern credit risk, and then it puts forth the selection model of collaborative credit-granting guaranty approaches on the basis of capital property pricing, and some corresponding conclusions are further drawn on the empirical studies. At the same time, n-tier expansion is made for the collaborative credit-granting monitoring mechanism on the basis of AVE. Under this mechanism, the credit risk in the AVE enterprises can be optimized; and the AVE chain matches the working mechanism in their capacities of real-time resource sharing, n-tier resource allocation, mission assignment, control and supervision. Ultimately, the distance management and risk blockage could be achieved on the supply chains in the all the AVE enterprises by forming a strong self-organized and self-control working chain.

Supplier Selection Using Rough Set Theory

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¹National Chen-Chi University, Taiwan
²National Ilan University, Taiwan
³Fo Guang University, Taiwan

The purpose of this study was to build a model of supplier selection to improve organizational capability and competitiveness, as well as to apply the model to solve practical problems. The critical criteria for supplier evaluation were chosen and the questionnaire was developed after literature review. The questionnaire differentiates Class 1 (excellent firms), Class 2 (common firms), and Class 3 (disappointed firms) from suppliers to be evaluated by participants. Then a rough set theory (RST) was used to analyze the rules of supplier selection. After attribute reduct and core were derived, the decision-making rules were created by the supplier selection model. The study shows that rough set theory can be adopted as main analysis method for enterprises to find the optimum supplier partners quickly and accurately in designing and organizing of supply chain.

A Hybrid Fuzzy Clustering PSO Algorithm for a Clustering Supplier Problem

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²University of Tehran, Iran

This paper presents a fuzzy decision-making approach to deal with a clustering supplier problem in a supply chain system. During recent years, determining suitable suppliers in the supply chain has become a key strategic consideration. However, the nature of these decisions is usually complex and unstructured. In general, many quantitative and qualitative factors, such as quality, price, and flexibility and delivery performance, must be considered to determine suitable suppliers. The aim of this study is to present a new approach for a particle swarm optimization (PSO) algorithm to clustering suppliers under fuzzy environments into manageable smaller groups with similar characteristics. Our numerical analysis indicates that the proposed PSO improves the performance of the fuzzy c-means (FCM) algorithm.

Session	B (13:30 - 15:00)
Topic	Supply Chain Management (2)
Date	Monday - December 3, 2007
Room	Mercury I
Chairs	Noor Hasnah Moin and Christoph Schwindt

Supply Chain Grounded on Information Theory: A Hierarchical Economic Information Filtering Model of Supplier Selection

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This paper establishes a new hierarchical economic information filter model of supplier selection by analyzing the development process of the supplier selection methods as well as the historic criterion system and on the basis of the results of multiple turns of investigating and interviewing the management staff in different manufacturing enterprises. This model divides the selection process where the leading enterprises on the supply chain choose the suppliers into three stages: the stage of information collection and release, the stage of supplier selection and the stage of dynamic assessment of suppliers, corresponding to the criterion system of selecting and evaluating suppliers in Hierarchy1 search, Hierarchy2 search, and Hierarchy 3 search. The establishment and application of this model can help specify the major tasks and foci of selecting and evaluating suppliers at different stages. It can help the leading enterprises adjust suppliers dynamically in terms of the assessment results. It can help shield from information disturbance and noises in selecting and evaluating suppliers at different stages. It can be seen as an extension of filtering economic information at different stages and in different modules.

Supply Chain Grounded on Information Theory: Criterion Weighting and Its Explication of A Hierarchical Economic Information Filtering Model of Supplier Selection

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This paper explicates the criterion system weighting and importance sequence of supplier selection synthetically, in terms of Hierarchy Economic Information Filtering Model, multiple turns of feedback from the management staff in manufacturing industries as well as Analytic Hierarchy Process. Hierarchy Economic Information Filtering Model helps increase the probability of gaining valid information in supplier selection. The criterion system in the model is the valid information collection in supplier selection. The mean of dyadic comparisons among each hierarchy criterion is the degree of information relative importance in supplier selection. The results of each hierarchy criterion sequence are the importance sequencing of the information weight in valid information collection in supplier selection. Hierarchy Economic Information Filtering Model defines the information search criterion of supplier selection. It helps increase information search efficiency, save information search time and reduce cost. It helps dynamic supplier information filtrate, select, treat and response in real time.

A Simulation and Prediction Model to enhance e-Service Sharing and SCM Market Competition

Johannes K. Chiang¹, Kiekang Chao¹

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Traffic behavior in a large-scale logistic network can be viewed as a complex non-linear system. It is very difficult to illustrate the long-term network service traffic behavior in a large-scale network. The Internet, underlying the modern SCM, can be seen as the combination of Service Providers (SPs) and Internet Service Exchange (IXPs) providers. There are increasing professional logistic service providers become brick-and-mortar SP-firms in e-business. Due to market competition among SPs and IXPs, Internet users, such users of logistic services, will experience a different and enhanced quality of services (QoS), consequently affecting the network traffic model.

This paper presents a cybernetic traffic model in the IXPs / SPs environment, this model simulates IXPs / SPs market competition behavior and determines that Exchange-providers' market share will be diluted through market competition. Routing as well as service binding strategies are presented / proposed in this study. This paper is also to present routing strategies to vary according to the different competing environments resulting in a model that is meant to lead competitive pricing strategies and capacity allocation for intelligent SCM decision support.

Alignment Strategies of AMT with E-Commerce Setting to Improve Business Strategy in the Supply Chain Operations Environment - An Empirical Study

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The purpose of this study is to explore which alignment strategies of advanced manufacturing technology (AMT) with e-commerce setting can develop adequate condition to meet different business strategies requirements in practice. This study is based on 127 Asian samples sieved from the International Manufacturing Strategy Survey (IMSS) database, and applies a hypothesis-test to infer the result. From these Asian samples, we found that the manufacturers usually adopt two business strategies such as product strategy, and high-quality product/delivery strategies to maintain or improve competitive advantage. To As to what business strategies can be successfully put into practice, the results of test indicates that two different alignment strategies of AMT with e-commerce setting can develop appropriate condition to satisfy the requirements of two kind of business strategies. Our finding provides the insight very beneficial for manufacturers to reconsider their alignment strategies of AMT with e-commerce setting to meet business strategies in different context.

Sourcing from China – The Challenges of Swiss Companies

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Global sourcing and especially sourcing from China is growing rapidly in importance worldwide. This is also true for Switzerland. This paper presents the challenges facing Swiss companies of different sizes and depth of experience when sourcing from China, based on a case study of 8 companies. The 34 challenges are structured along a global sourcing process and the type of distance (psychic or geographical). The results show that severe problems remain not only in areas that attract current research interests, but also in areas that are well-established in literature. Scholars therefore face the double challenge of enhancing the state of the art in research, as well as transferring effectively already established concepts into the industrial practice.

Can Learning Intelligence Outperforms Information Sharing in Supply Chain Performances - An Order Arrival Prediction Perspective

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To improve competitive advantage and operational performances of supply chains, we implement multi-agent supply chain modeling with learning capability to predict order arrival times that manufacturers can pre-produce to shorten order lead time for downstream customer orders. As order lead time is reduced, bullwhip effect of supply chains would also be minimized. Two kinds of learning agents are embedded in traditional supply chains to learn from past experiences to predict next order arrival time. We use back propagation neural networks and an order arrival pattern matching (OAPM) algorithm with belief set models for the prediction. The performances are compared with the traditional supply chain and the VMI-based supply chain. Results show that even with tailored learning intelligence, the VMI-based supply chain still performs better than the others. However, the two supply chains with learning agents outperform the traditional supply chain. This implies that learning intelligence can assist in predicting order arrival times, but information sharing seems to do it even better.

Session	C (15:30 - 17:30)
Topic	Supply Chain Management (3)
Date	Monday - December 3, 2007
Room	Mercury I
Chairs	Ching-Jung Ting and Young Park

Minimum Cost Delivery Problem in Intermodal Transportation Networks

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Intermodal movements are those in which two or more different transportation modes are linked end-to-end in order to move freight and/or people from point of origin to point of destination. In the intermodal transportation network, the departure times of the transportation modes are pre-scheduled and there is a list of departure times associated with each transportation mode. This paper considers the problem of finding the minimum cost delivery route for an origin-destination pair where the total cost of a delivery consists of the transportation cost, the transition cost and the holding cost of possible transshipping. We provide a method which expands the intermodal transportation network on time-space into a general network in which each arc only associates with one attribute, namely, the arc cost. We show that given a release time at the origin and a due date at the destination, the minimum cost delivery problem is equivalent with a shortest path problem in the time-space network. Hence, the problem can be solved efficiently.

Simulation of Order Scheduling under Hybrid Order Fulfillment Strategy

Uwe Clausen¹, Ling Zhou¹, Sandeep B. Khot¹, Bernhard Heimann¹

¹Dortmund University, Germany

In recent aggressive competition age, automobile manufacturing industries are trying to implement innovative strategies compare to traditional Build-To-Forecast to cut large order fulfillment time (lead times). The research work here concentrates on the discrete-event-simulation of order-scheduling process in automobile industry and try to explore the possibilities of innovative strategies for optimization of order scheduling and hence lead-times. It gives detailed analysis of order fulfillment process and strategies through practical case studies in automotive industries. It introduces new hybrid strategy, which is supported by results obtained in simulation model

Selection of Potential 3PL Services Providers Using TOPSIS with Interval Data

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¹Indian Institute of Technology, India

Third party logistics (3PL) providers plays a vital role in fulfilling the dream of shippers through effective logistical supply chain management. 3PL services providers satisfy the customers' demand of supplying the shippers' product in required time at required destination thereby help the shippers in enhancing their market share. The efficient supply of their products, not only wins the heart of the worthy customers, but also fetches profits which expand their business. However, the shippers objectives may gets fulfilled only by selecting potential 3PL services providers, hence a care must be taken before the contract is awarded to 3PL services providers. The paper presents the methodology to earmark potential 3PL services providers using Technique for Order preference by Similarity to Ideal Solution (TOPSIS) methodology with interval data. Criteria importance weights have been derived using Analytic Hierarchy Process (AHP) in order to judge 3PL services providers. The paper presents the extended TOPSIS methodology, by illustrating a case problem.

Implementing Design for Six Sigma for Supply Chain Design

Yousef Amer¹, Lee Luong¹, Sang-Heon Lee¹, William Y C Wang¹, Muhammad Ashraf¹, Zahid Qureshi¹

¹University of South Australia, Australia

The changing paradigms in Manufacturing in the global market since the late 1990's have seen the emergence of more collaborative manufacturing ventures, an increase in outsourcing and a review of the relationship between manufacturing, operations management and logistics and their place in the overall supply chain. Building effective supply chains has become a way to develop a firm's competitiveness and profitability requiring firms to make the shift from a functionally based organisation to one focused on business processes, first internally and then across the supply chain members. Consequently supply chain members must have measurable outcomes that reflect bottom line

improvement in supply chain processes and research is required to understand how to identify appropriate supply chain metrics, implement them and measure results. Generic supply chain frameworks such as the Supply Chain Operations Reference (SCOR) model aim to develop a common supply chain approach for firms with an emphasis on benchmarking but there is some criticism that broader frameworks are required so that managers can link supply chain improvement to strategic plans, key performance indicators and improvement goals. This paper presents Design for Six Sigma (DFSS) as a versatile methodology for approaching supply chain design and performance measurement. The Demand Management process is described as a critical to customer requirements (CCRs) and its importance to business performance elaborated.

Research on the Problem of Deteriorating Items Multi-warehouse

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The research on the problem of multi-warehouse according to the characteristics of deteriorating items can reduce the storage cost of the deteriorating items, and raise the profits. The model of deteriorating items multi-warehouse is constructed using the mathematical analysis method, which is used for solving the multi-warehouse problem of ensuring the number and reserve of the rented warehouse that already have an owned warehouse. The value analysis was operated using the backstepping method. The result shows: This method is practical and effective.

Employing Genetic Algorithms to Minimise the Bullwhip Effect in a Supply Chain

Jianping Lu¹, Paul Humphreys¹, Ronan McIvor¹, Liam Maguire¹

¹University of Ulster, United Kingdom

There has been considerable research interest in the last number of years demonstrating the effectiveness of Genetic Algorithms (GAs) to reduce the Bullwhip Effect in supply chain management. One criticism of this research is that the supply chain models employed have been unrealistic and consider only a few stages within a supply chain. In this paper, the authors present an improved supply chain model, which is based on the beer game and includes additional cost factors including ordering cost, distribution cost, production cost. GAs are then employed to determine the optimal ordering policy for each member in the model. Through the experimental results, this paper demonstrates that GAs can reduce the bullwhip effect and determine the optimal order-ing policy even in more complex supply chains.

Trust Evaluation Model for Fractal-based Virtual Enterprises Using Goal Achievement Probability

Jungtae Mun¹, Moonsoo Shin¹, Kyunghuy Lee², Mooyoung Jung¹

¹POSTECH, South Korea

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In current business environment, competitiveness is no longer between enterprises, but between enterprise networks because individual enterprises often do not have all the necessary skills and competencies to satisfy the new market requirements. In this environment, finding the right and trustworthy partners largely affects the success of a virtual organization (VO) or a virtual enterprise (VE). This paper proposes a fuzzy trust evaluation model of three types of fractal-based virtual enterprises; a single enterprise, a VO, and a VE. The goals and the decision-maker's preferences are the inputs of the proposed model. An evaluated trust value of an enterprise represents a weighted goal achievement probability of how it could contribute to the success of a VO or a VE.

A Fuzzy Association Rules Mining Approach for Modeling Agility in Supply Chains

Vipul Jain¹, Lyes Benyoucef¹

¹INRIA-France, France

The key issue is the ability of the integrated supply chains to deliver on competitive objectives of Flexibility, Profitability, Quality, Innovativeness, Pro-activity, Speed of response, Cost and Robustness. It is therefore imperative to discover the relationships between these agility attributes for supply chains in order to determine analytical evaluation of agility. In this paper, we develop an approach based on Fuzzy Association Rule Mining to support the decision makers by enhancing the flexibility in making decisions for modeling agility with both tangibles and intangibles attributes. Also, by checking the fuzzy classification rules, the goal of knowledge acquisition can be achieved in a framework in which evaluation of agility could be established without constraints, and consequently checked and compared in several details. Efficacy and intricacy of the proposed model for finding fuzzy association rules from the database for evaluating agility is demonstrated with the help of a numerical example.

Session	A (11:00 - 12:30)
Topic	Operations Research and Application (1)
Date	Monday - December 3, 2007
Room	Mercury II
Chairs	Huifen Chen and Seok Ho Chang

Sensitivity of Manufacturer and Buyer's Risks for Lifetime Warranty Policies

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²Central Queensland University, Australia

Lifetime warranties is becoming popular as they provide assurance to buyer for longer reliable service and greater customer peace of mind for the whole life of the product. By offering a lifetime warranty, both the manufacturer and the buyer are exposed to uncertainties and risks of warranty pricing and product performance during the lifetime of the product. This paper analyses the sensitivity of risk preferences models developed by Chattopadhyay and Rahman in finding the optimal warranty price through the use of the manufacturer's utility function for manufacturer's profit and the buyer's utility function for repair cost. The sensitivity of the warranty price is analysed with numerical example with respect to the factors such as the buyer's and the manufacturer/dealer's risk preferences, buyer's anticipated and manufacturer's estimated product failure intensity, the buyer's loyalty to the original manufacturer/dealer in repairing failed product and the buyer's repair costs for unwarranted products.

Incorporating Probabilistic Fuzzy Sets into the Newsvendor Model with Hybrid Data

Huei-Fu Lu¹

¹Aletheia University, Taiwan

This paper is to apply a fuzzy newsvendor inventory management approach to analyze optimal order policy based on probabilistic fuzzy sets with hybrid data so that the expected total cost is minimized. We will find that, after defuzzification, the ordering quantity and the expected total cost have slightly different between the fuzzy model and the crisp model when the variation of demand is small. As a result, we verify that the fuzzy newsvendor model is one extension of the crisp models. Most importantly, one may conclude that the fuzzy methodology leads to a better result than using a single point estimate of the unknown demand under the example of exponential distribution.

Analysis of an Unreliable Batch Machine and a Finite Buffer Fed by an Unreliable Single-Item Machine: Partial Batches

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²Massachusetts Institute of Technology, United States

This paper considers a flow line with two unreliable machines and a finite buffer. The first machine is an unreliable single-item machine and the second machine is an unreliable batch machine. The purpose of this paper is to present a model, and exact analysis of this system under the assumption of partial-batch control policy. We demonstrate generalized conservation of flow and flow rate-idle time relationships. We present performance measures such as production rate, expected in-process inventory, mean size of batch served in the second machine, and probabilities of blocking and starvation.

A Robust Optimization Model for BTO Manufacturing Revenue Management

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¹Huazhong University of Science & Technology, China

²Beijing Institute of Technology, China

Based on revenue management, the pricing and capacity allocation problem for Build-to-order (BTO) manufacturing industry is studied quantitatively under uncertainty circumstances. Firstly, a joint pricing and capacity allocation model is proposed based on the analysis of the characteristics for BTO manufacturing revenue management. Then, due to the demand uncertainty, a robust optimization model is proposed to solve the model. Finally, a case study is formulated via numerical simulations. The results illustrate the effectiveness of the model and provide several managerial insights into the performance of revenue management in BTO manufacturing.

Disjunctive and Time-indexed Formulations for Non-preemptive Job Shop Scheduling with Resource Availability Constraints

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In many real industrial situations machines may be non-available for processing jobs for instance when a machine breaks down or when a preventive maintenance activity is scheduled. This paper deals with the job shop scheduling problem when machines are not continuously available and this for better modeling of the industry reality. We assume that no preemption is allowed and we introduce flexibility on machine unavailability periods by assuming that these latter are planned in time windows. This flexibility is relevant when scheduling preventive machine maintenance. Two mathematical models are presented and compared. The first one is based on the disjunctive graph and the second one is time-indexed. Numerical experiments on generated benchmarks were performed with ILOG CPLEX 10.

Design Considerations of Terrestrial Communications System

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We study design considerations, measure of effectiveness (MOE) factors, for tactical communications system. Terrestrial Communications System (TCS) architecture for Army is described and the link delay performance as a grade of service (GOS) factor is analyzed. One can see that flood search routing algorithm in mesh networks is well suited for tactical communications network and survivability requirements.

Session	B (13:30 - 15:00)
Topic	Operations Research and Application (2)
Date	Monday - December 3, 2007
Room	Mercury II
Chairs	Gopinath Chattopadhyay and Huei-Fu Lu

A Numerical Method for Solving a Class of Continuous-time Linear Programming Problems

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¹Kaohsiung Medical University, Taiwan

²Vanung University, Taiwan

In this paper, we discuss a class of continuous-time linear programming problems (CLP) posed in a function space. A practical and simple method for finding approximate solutions of (CLP) is presented. The convergence proof is provided for the proposed scheme. By our constructive manner the error bound of every approximate value can be estimated as well.

A Model of Placing a Liaison in the Same Level of a Pyramid Organization Structure

Kiyoshi Sawada¹

¹University of Marketing & Distribution Sciences, Japan

This paper proposes a model of placing a liaison which forms relations to all members with the same level in a pyramid organization structure such that the communication of information between every member in the organization becomes the most efficient. For the model of adding a node of liaison which gets adjacent to all nodes with the same depth N in a complete K -ary tree of height H which can describe the basic type of a pyramid organization, we obtained an optimal depth N^* which maximizes the sum of shortening lengths of shortest paths between every pair of all nodes in a complete K -ary tree. It is shown that the optimal depth is $N^*=H$, irrespective of K . This result means that the most efficient level of forming relations to a liaison is the lowest level of the organization structure, irrespective of the number of subordinates.

Investigation on the short-term variations of Electricity Demand due to the Climate Changes via a Hybrid TSK-FR Model

Hamed Shakouri G.¹, Reza Nadimi¹

¹University of Tehran, Iran

Electricity demand forecasts in the short-terms have a vital application in electricity markets. Knowing that Energy is a product of Power in Time, in this study, a fuzzy based relation between the climate change and the average electricity consumption duration is investigated. This paper introduces a type III TSK fuzzy inference machine combined with a set of linear and nonlinear fuzzy regressors in the consequent part to model effects of the climate change on the electricity demand. However, a simplified version of the model is applied to daily data of the average temperature in Tehran, 2004. First, based on an initially fitted nonlinear curve, an optimization model is employed to cluster data into three groups of cold, temperate and hot. The fuzzy data have been expanded to reduce the temperature volatile property. Then the relation is estimated by the fuzzy regressions (REG) in company with the TSK model. Numerical results show high efficiency of the proposed combined fuzzy model.

Implementation of Particle Swarm Optimization in Construction of Optimal Risky Portfolios

Mohammad Ali Dashti¹, Yaghub Farjami¹, Ahmad Vedadi¹, Mohammad Anisseh²

¹Islamic Azad University, Iran

²University Electrical & Computer Research Center, Iran

Since Markowitz's substantial work, the mean-variance model has revolutionized the way people think about portfolio of assets. According to the modern portfolio theory, the fundamental principle of financial investments is a diversification where investors diversify their investments into different types of assets. Constructing an optimal risky portfolio is a high-dimensional constrained optimization problem where financial investors look for an optimal combination of their investments among different financial assets with the aim of achieving a maximum reward-to-variability ratio. Among the various methodologies suggested, the most popular one is based on maximizing the well-known Sharpe ratio.

In this study, we apply particle swarm optimization (PSO) for constructing optimal risky portfolios based on Sharpe ratio for financial investments. A particle swarm solver is developed and tested on a risky investment portfolio. The method is applied to a sample of stocks in Tehran Stock Exchange. Experimental results reveal that the proposed PSO algorithm provides a very feasible and useful tool to assist the investors in planning their investment strategy and constructing their portfolio.

Critical Routes Determination for Emergency Transportation Network aftermath Earthquake

Afshin Shariat Mohaymany¹, Nasim Pirnazar¹

¹Iran University of Science & Technology, Iran

Transportation networks have a vital role after math earthquake, therefore they are called as lifelines. Identifying critical routes for earthquake response in a populated city is very important. This paper presents a goal programming (GP) approach to solve maximal covering network design problem (MCNDP) in order to identify critical routes, for earthquake response and to seismically retrofit bridges. Because of the conflict exists between goals which are minimization of the total travel time on selected routes and maximization of the total covered population, a goal programming based approach for solving MCNDP is proposed. This approach is developed base on desirability of decision maker (DM) and tolerances which are considered on goal values. To illustrate behavior of proposed model, a numerical example is provided and solved. Computational results demonstrate the effectiveness of the proposed approach.

Modeling of Energy Efficiency Indicator for Semiconductor Industry

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²Takming University of Science & Technology, Taiwan

For purposes of energy conservation and environmental protection, the government of Taiwan has set long-term, solid policies to continuously encourage and assist the industry in improving the efficiency of energy utilization. While practical energy saving has been successful to a limited extent due to multiple actions, no strong evidence of improvement in energy efficiency was observed from the energy efficiency indicators (EEI) system, according to annual national energy statistics and survey. In order to answer the question what the role energy efficiency plays in the EEI system, a structural analysis of EEI is absolutely inevitable.

The model is developed on the premise that the design parameters of the process are used to compare against the operational parameters for energy differences. Utilization index of production capability and variation index of energy utilization are formulated as two variables in the model to describe the differences between EEIs. An industrial example that produces eight-inch silicon wafer in the semiconductor industry of Taiwan was selected to demonstrate the application of the model. The annual energy utilization efficiency of the process was evaluated and the amount of energy that had been saved or overused in the process was computed as well.

Session	C (15:30 - 17:30)
Topic	Operations Research and Application (3)
Date	Monday - December 3, 2007
Room	Mercury II
Chairs	Stein W. Wallace and Hamed Shakouri G.

A Common Weighted Performance Evaluation Process by Using Data Envelopment Analysis Models

Ching-Hsiang Lai¹, Meng-Ying Wei¹

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The finance literature searches for a link between production and performance, controlling for variables, such as sales, firm size, employee number, etc., that influence production packages. The performance indices are designed according to the resulting effects and determine whether the performance model is appropriate or not, and/or whether the performance of system is good or not. In this paper, a process, based on data envelopment analysis (DEA), is developed to evaluate and rank the relative importance of key performance indices (KPIs). The relative importance of each KPI is evaluated by performance loss measure, and each KPI is weighted according to the measure. Then, the relative performance of each unit is the ratio of weighted output to weighted input based on the common weights.

Optimization of Fuzzy Relational Equations with a Linear Convex Combination of Max-min and Max-average Compositions

Yan-Kuen Wu¹, Wen-Wei Yang¹

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Max-min and max-product compositions are commonly utilized to optimize a linear objective function subject to fuzzy relational equations. Both are members in the class of max-t-norm composition. In this study, a linear convex combination of max-min and max-average compositions is considered for the same optimization model, which does not belong to the max-t-norm composition. However, this convex combined composition generates some properties of the solution set that are similar to the max-product composition, but different with max-min composition. Hence, the method applied to optimize the linear programming problem with max-product composition can be employed again to solve the same problem. Moreover, this study will show that the tabular method provided by Ghodousian and Khorram can not guarantee to obtain an optimal solution for the same optimization model.

Multi-response Grinding Process Functional Approximation and Its Influence on Solution Quality of a Modified Tabu Search

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In this paper, the solution quality of a modified tabu search (MTS) strategy for a constrained, two-stage, multi-response, and continuous variable grinding process optimization problem is studied for varied degree of process functional approximations. Multivariate regression (MR) and artificial neural network (ANN) is selected, and found to be suitable for process functional approximation or modelling at each stage of grinding. Integrating these functional approximations or process models (MR or ANN-based) with desirability functions, near-optimal solutions (expressed in terms of mean and standard deviation of a single primary objective measure or a composite desirability at the final stage) is determined using MTS strategy. The computational run results show that MTS is efficient and suitable to determine near optimal acceptable solutions for varied degree of functional approximation for the two-stage constrained optimization problem. However, the results also indicate that MTS provide inferior or sub-optimal solutions for higher order nonlinear approximation (based on ANN models) as compared to MR-based classical linear models.

Modified Value Iteration for Chemotherapy Scheduling Optimization

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An optimization algorithm for chemotherapy scheduling study is developed in this paper. We consider the density of host and cancer cells of a patient as states, and define the optimal chemotherapy scheduling as the shortest treatment path that will cure the patient, if possible. Given the fact that the treatment time is always interger-valued in our model, we used a modified version of the value iteration algorithm originally designed for Markov Decision Process. Simulation results and discussions are also given.

360 Degree Personnel Performance Appraisal Using the MADM Models and Presenting a Model for overall Ranking

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Since in the late observations, personnel performance appraisal is considered as a tool towards achieving organization goals, in which, the main idea is to increase the abilities and suitability and growth of personnel. In this paper the performance appraisal is seen as an element of group decision making and therefore, the 360 degree model performance appraisal has been used, in which, the personnel are evaluated from different points of view, (Boss, Colleagues (Co-worker), Inferior, employee him/herself, customer and etc...), keeping in mind the attributes weights, and relative importance of auditors evaluations, the MADM models have been used for personnel ranking. Finally an overall ranking resulted from new model. The forgoing method has been used in a case study and the result and data have been evaluated from different points of view.

Study on Plan of Track Lines in Marshalling Station

Shidong Wang¹, Li Zheng¹, Zhihai Zhang¹

¹Tsinghua University, China

The plan of track lines is an important factor which influences the efficiency of marshaling station. When a train reaches the station, schedulers need to decide which track will be occupied by train and how long the train will stay at the track. The problem is NP-complete when the number of track and train are unfixed. After the mathematical model is analyzed, the schedule of single track can be transformed into a weighted clique problem, and a polynomial algorithm is designed. For solving the schedule problem of multi-track, two heuristic algorithms are introduced, and genetic algorithm is also adopted. Moreover, some benchmarks which data are generated randomly are used to validate the rational efficiency and computation burden of foregoing algorithms.

A Decision Support System for the Reserve Bank of India to Forecast Currency requirements at Currency Chests

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¹Indian Institute of Technology Madras, India

This paper presents a case-study of the logistics management of currency notes by the Reserve Bank of India (RBI), the country's central bank. RBI has the responsibility of replenishing currency to various chests spread all over the country. The chests distribute currency to individual banks that serve the public. A chest is a receptacle that can hold huge volumes of currency and acts as an extended arm of the RBI. Currently, RBI makes replenishment decisions based on past record and on requests from individual chests. This has resulted in excess inventory at some chests and shortages at some others. In order to streamline this process, a Decision Support System (DSS) that can forecast currency requirements and suggest inventory (currency) levels has been developed. The DSS is embedded with multiple techniques and can select the technique that minimizes error in forecasting future currency requirements. These forecasts serve as a basis to determine inventory levels for individual chests. The DSS is currently being piloted in one state of India.

Artificial Immune Systems for Intelligent Nurse Rostering

Chih-Chung Lo¹, Chih-Chang Lin¹, Cheng-Tzu Wang², Ting-Jung Dai³,

Dominic Wong¹

¹Fo Guang University, Taiwan

²National Taipei University of Education, Taiwan

³Hong Cheng International Technology Inc., Taiwan

Nurse rostering is an essential and important task for hospital administration. In this paper, an intelligent nurse rostering system is proposed by using two types of artificial immune systems, CLONALG and aiNet, as the intelligent mechanisms. The performance of both artificial immune systems is examined, and the results indicate that both artificial immune systems provide good intelligent solutions to solve nurse rostering problems efficiently and effectively. In addition, it is also found that CLONALG is a more efficient intelligent nurse rostering mechanism when time-consuming WHAT-IF analysis is frequently needed.

Session	A (11:00 - 12:30)
Topic	Decision Analysis and Methods (1)
Date	Monday - December 3, 2007
Room	Mercury III
Chairs	Ming-Lang Tseng and Miaoling Wang

A Class of Fuzzy Rough Inventory Model and Its Application

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In this paper, we concentrate on discussing and developing a fuzzy rough multi-objective inventory model. We present some crisp equivalent models and a traditional algorithm based on an interactive fuzzy satisfying method to obtain the decision maker's satisfying solution. Then these are applied to a practical inventory problem in which all inventory costs, purchasing and selling prices in the objectives and constraints are assumed to be fuzzy rough variables in nature. Finally, numerical example are given in order to show the application of the proposed models and algorithm, which will be of much use of the management, provide significant solutions to construct other inventory models with fuzzy rough variables in real life.

Applying SVM to Build Supplier Evaluation Model - Comparing Likert Scale and Fuzzy Scale

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²National Chen-Chi University, Taiwan

³National Ilan University, Taiwan

This research was performed to generate a supplier evaluation (SE) model in order to enhance an enterprise's competitiveness, and apply this model to solve practical business problems. Through past studies, we applied representative supplier evaluation principles while designing supplier evaluation questionnaire, and classified the suppliers into three categories: perform excellently (class 1), perform ordinary (class 2), and perform poorly (class 3). The Likert scale and Fuzzy scale are applied individually to compute a score according to these principles. We then apply the support vector machine (SVM) to build the supplier evaluation classifier, and observe under SVM whether using the Likert or Fuzzy scale produces better classification performance. The result revealed that the performance is invariant under both scales. Therefore, we find SVM combined with efficient feature reduction to be a better strategy for building a supplier evaluation model.

A Class of Facility Location Model and Its Application

Yuan Zhang¹, Jiuping Xu¹

¹Sichuan University, China

In the logistics system, the facility location problem, which can be used to determine the mode, the structure and the form of the whole logistics system, is a very important decision problem in the logistics network. Often uncertainty may be associated with demand, supply or various relevant costs. In some cases, roughness and fuzziness simultaneously appear in a system, in order to describe this phenomena, we introduce the concept of hybrid variable and propose a mixed integer programming model for rough fuzzy facilities location problem.

Dynamic Stochastic Programming for Asset Allocation Problem

Haiqing Song¹, Huei-Chuen Huang²

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Asset allocation is an important decision problem in financial planning. In this paper, we study the multistage dynamic assets allocation problem which an investor is allowed to reallocate its wealth among a set of assets over finite discrete decision points, in which the stochastic return rates of the assets follow a Markov chain with nonstationary transition probability. The objective is to maximize the utility of the wealth at the end of the planning horizon where the utility of the wealth follows a general piecewise linear and concave function. Transaction costs are considered. We formulate the problem with a dynamic stochastic programming model and develop a method that decomposes the problem into stage-based subproblems to solve it. The main advantage of this method is that it provides a computationally tractable tool to deal with the dynamic asset allocation problem of long planning horizon.

ERP Sandtable Simulation Evaluation Based on ANP

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ANP (Analytic Network Process) is a decision-making method based on AHP (Analytic Hierarchy Process) for solving problems with feedback and dependence. In this paper, the theory of ANP will be introduced. An illustration on ERP (Enterprise Resource Planning) sandtable simulation evaluation is presented to discuss how to make a decision using ANP.

An Integrated Theory-Of-Constraints

Amitava Ray¹, Bijan Sarkar¹, Subir Sanyal¹

¹Jadavpur University, India

The objective of this research is to investigate the integration of Theory-Of-Constraints, Analytic Hierarchy Process and Linear Programming so as to provide management with the capability of making outsourcing decision. This paper compares possible solution between Standard cost accounting, standard Theory-Of-Constraints and an approach that combines Standard Theory-Of-Constraints - Analytic Hierarchy Process-Linear programming. Numerical results shows that combined model is better than traditional model. This research is limited to the production process where there is no multiple constraints.

Session	B (13:30 - 15:00)
Topic	Decision Analysis and Methods (2)
Date	Monday - December 3, 2007
Room	Mercury III
Chairs	Ikou Kaku and Haiqing Song

A HMM Based Method for Selecting the Solution of Function Module

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¹Northwestern Polytechnical University, China

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A systematic method is developed to select the optimal combination of solutions for each function module existing in a pre-defined Product Function Model (PFM). Based on the definition of three fundamental modes for constructing a PFM, any PFM generated from customer requirements could be transformed into a uniform seriesconnection format. Then, Hidden Markov Model (HMM) is introduced to model the process of selecting solutions for each function module, and all the parameters in HMM can be calculated from the existing available information of these solutions. Furthermore, In order to avoid generating an exponential number of instantiations, the Viterbi algorithm is proposed to seek the optimal combination of solution during the conceptual design phase of a new product.

Research on FTOPSIS Model of Threat Synthetic Evaluation in Multi-target Tracing System

Baihe Wang¹, Jianguo Huang¹, Xiansheng Qin¹, Zhenhua Yan¹, Jing Bai¹

¹Northwestern Polytechnical University, China

Threat evaluation is the most important component of multi-target tracing (MTT) system, and Target information is often imprecise and fuzzy. Many multiple attribute decision making (MADM) methods were utilized to evaluate the threat extent of aerial targets, such as the analytic hierarchy process (AHP), fuzzy optimum (FO), the technique of order preference by similarity to ideal solution (TOPSIS) and gray relation analysis (GRA). In this paper, a new method of threat synthetic evaluation named Fuzzy-TOPSIS (FTOPSIS) is presented, and a model of FTOPSIS is established to solve the problems of target optimization and misjudgment of target attacked. This new method has high precision and shows better performance than other classical methods. The simulation results show that the system using FTOPSIS has highest effectiveness. Compared with other classical methods, the effectiveness of the system using FTOPSIS is about 23% higher than the AHP, 17% higher than the FO, 11% higher than TOPSIS, and 10% higher than the GRA. FTOPSIS has good application in project and can be used practically.

Modeling and Deriving Strategic Logistic Measures

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In order to thrive in global markets enterprises have to distinguish themselves from their competitors not only by manufacturing high quality products at low costs, but also with a superior logistic performance. A high logistic performance is aided by means of Logistic Operating Curves (LOC). These can be utilized in modeling the effects of logistic measures. Based on the LOC, a Decision Support System (DSS) can be designed that uses standard financial mathematics to evaluate appropriate measures and measure bundles, based on the specific situation. This should permit the user to choose the most efficient measures.

A Multiplicative Optimization Model for Constructing Composite Indicators

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Composite indicators (CIs) have been widely used for benchmarking and performance comparisons in many different areas. Past studies have shown that the weighted product method may be a good choice in constructing CIs. However, a problem in its application is the determination of the weights for sub-indicators. This paper extends the weighted product method and proposes a multiplicative optimization model for constructing CIs to avoid the subjectivity in determining the weights for sub-indicators. Additional information on the weights, if available, can be easily incorporated into the proposed model. A case study on the Technology Achievement Index is given to illustrate the use of the proposed multiplicative optimization model.

Modeling Software Integration Scenarios for Telecommunications Operations Software Vendors

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Telecom operators deploy a vast number of software systems to support their operations. Vendors of these systems often integrate such software in their products in order to enable innovations, minimize the customer's integration efforts, etc. Different integration scenarios can be envisioned, and the issue of identifying more beneficial scenarios is of a great importance to the vendors.

This paper focuses on analyzing different integration scenarios in the context of telecommunications operations software. For each scenario, the overall modularity of the set of software systems is evaluated, and the expected benefits of the scenario are modeled in terms of the modularity gain it provides. The paper introduces a modularity-based approach to the integration scenario analysis, and applies it to compare the benefits that can be obtained from each scenario. As a result of the analysis, the scenarios which are likely to be more beneficial for the vendors (and therefore more likely to occur) are identified.

An AHP/DEA Hybrid Model for Measuring the Relative Efficiency of Energy Efficiency Technologies

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²The University of Tokyo, Japan

Due to the expiration of the national energy and resources plan, established in 1997, and Korean government needs to build a new one coping with 10 years from 2006 through 2015 strategically. In this paper, we prioritize the relative weights of energy technologies in the sector of the national energy efficiency plan by using the AHP/DEA hybrid model, which is one of the multi-criteria decision making (MCDM) method composed of the analytic hierarchy process and data envelopment analysis. We suggest a scientific procedure to measure the relative efficiency and priorities of energy efficiency technologies as decision maker and energy policy makers make a national decision and energy policy.

Session	C (15:30 - 17:30)
Topic	Decision Analysis and Methods (3)
Date	Monday - December 3, 2007
Room	Mercury III
Chairs	Jiuping Xu and Felix Wriggers

Developing a Systematic Method for Constructing the Function Platform of Product Family

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A systematic method to construct the function platform for a specific product family is proposed. Based on the function basis and heuristic method, function modules of each product variants existing in the current product family can be identified. These modules as well as their instances can be categorized according to relevant design variables. Then two distinct strategies, titled as multi-object optimal selection and similarity-based method separately are adopted to identify function modules which can be shared among different product variants and can be sequentially used to construct the product platform. As a result, this mixed method can support platform identification for various product family comprised of different kinds of product variants.

Optimal Pricing Strategies for Green Products Based on Win-Win Concept

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The promotion of green products is a resolution for reducing resource waste and improving environment pollution. Resources of green products are relatively limited which entails inconvenience and higher price for purchasing green products. Therefore, how to determine the amount that customers are willing to pay for them is an important issue. In this study, we proposed an analytical method to solve this problem. A list of questionnaires was designed to determine customers' behavior and preferences. Then, incorporating an MAUT technique, a win-win concept is adopted to develop a bi-objective nonlinear mixed integer problem. The results provide optimal price and promotion strategies, which ensure greater satisfaction on both suppliers and customers.

A Fuzzy Approach for Multilevel Multiobjective Programming Problems and the Concept of Generalized Lambda-Extreme Points

Hitoshi Yano¹

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In this paper, we focus on multilevel multiobjective programming problems where multiple decision makers in a hierarchical organization have their own multiple objective functions, and propose an interactive decision making method to obtain the satisfactory solution which reflects not only the hierarchical relationships between multiple decision makers but also their own preferences for their objective functions from among the generalized Λ -extreme point set. The generalized Λ -extreme point is defined by using Λ -extreme points of each of the decision makers, which is an extended concept of Pareto optimal solutions in multiobjective programming problems. In order to obtain the satisfactory solution from among the generalized Λ -extreme point set, an interactive fuzzy decision making method based on the hyperplane method is proposed.

Technology Assessment as Guidance to Business Management of New Technologies

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³Hung-Hwa Institution for Economic Research, Taiwan

Technology assessment becomes an important tool in the process of introducing new technologies to production and commercial phases. The paper goal is to reflect different aspects of technology assessment and their relative importance for future business performance. We developed a hierarchical model with multiple criteria to evaluate the alternative concepts in approaching technology assessment process on the corporate level. The presented model appears to be comprehensive, flexible and easy to implement in managerial practice. The illustrative example shows that in the case of mature company, the knowledge platform becomes a focus point of the technology assessment process.

Financial Characteristics and Prediction on Targets of M&A Based on SOM-Hopfield Neural Network

Hongjiu Liu¹, Huimin Chen¹, Yanrong Hu¹

¹Changshu Institute of Technology, China

In this paper, we apply self-organized mapping (SOM) and Hopfield neural network to cluster and predict the target of mergers and acquisitions. Financial characteristics of six sorts of targets are shown with low profitability, bad operation and good solvency very evidently by clustering of SOM. After calculating the means of variables of every sort, we build Hopfield network to predict the sort of targets and non-targets according to the means. Demonstration indicates Hopfield network can be used as prediction although accuracy of target selection is 80.69%, and non-target is 61.33 on the average. The reason is that financial data is not the only influence factors, many un-financial factor also have effect on the prediction.

A Scheduling-specific Modeling Approach for Real World Scheduling

Jacoline Grobler¹, Andries P. Engelbrecht¹

¹University of Pretoria, South Africa

This paper investigates the complexities associated with real-world production scheduling scenarios. A schedulingspecific modeling approach is provided, which encourages the incorporation of management input, a scheduling classification system and the context in which the scheduling solution will be deployed, into the development of production scheduling algorithms. A differential evolution-based scheduling algorithm was developed to facilitate the completion of the first iteration of the process as applied to a real-world scheduling problem. Apart from the significance of the paper in developing a schedulingspecific approach geared towards reducing the development time of production scheduling algorithms, the benefit of an improved production schedule can be generalized to include cost reduction, customer satisfaction, improved profitability and overall competitive advantage.

Fuzzy DEA Model Based on Cloud Theory

Wu Liao¹, Yun xiang Chen¹, Kun Li¹

¹Air Force Engineering University, China

Traditional data envelopment analysis (DEA) models require the values for all inputs and outputs should be known exactly. However, it is essential to take into account the presence of qualitative factors of inputs and outputs in a real evaluation problem. By referring to the cloud theory and conventional interval DEA model, this paper develops a new fuzzy DEA model called Cloud DEA (C-DEA) model to deal with qualitative factors. Through three digital parameters (Ex, En, He), the fuzziness and randomness of qualitative factors are integrated in a unified way. Based on cloud generator and α -level sets, qualitative information and fuzzy data are converted into interval data, respectively, and are incorporated into the interval DEA models. It shows in a numerical example that the C-DEA model has many advantages over the conventional DEA methodology and can be used to evaluate the relative efficiency of decision making units (DMUs) under uncertainty.

Applying the Real Options Approach to an Optimal Multi-stage Acquisition Model

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This study utilizes a real options approach to construct a mathematical decision-making model of multi-stage acquisitions so as to achieve an optimal strategy for the stages of negotiating, acquiring and exiting. This work assesses either waiting to acquire value and/or potential exit value or true value at each stage and provides to search a stable equilibrium solution which is recognized by acquiring and acquired firms. This investigation also considers the bidding strategy in the stage of negotiating. Furthermore, the proposed model of acquiring price which is decided by a mix-strategy for running the equilibrium expected firm value is also a main focus in this study.

Session	A (11:00 - 12:30)
Topic	E-Business and E-Commerce (1)
Date	Monday - December 3, 2007
Room	Jupiter I
Chairs	Indranil Bose and Wan Mei Soon

An Intelligent Agent-based Collaborative Workflow for Inter-enterprise PCB Product Design

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Currently, there is tremendous pressure to design and develop products in a short period of time to reduce time-to-market and project's life cycle. Researchers often propose workflow management system as a mechanism to facilitate teamwork in a collaborative product development environment. In this paper, we develop an agent-based collaborative workflow platform (ACWP), in which a group of intelligent agents work autonomously and collaboratively to perform workflow tasks and access data from a distributed environment. By the aid of intelligent agents, our system can execute customized workflow tasks for inter-enterprise users based on their individual requests, and conquer the complexity of product design in distributed, heterogeneous platform. The application of multi-agent systems ACWP for collaborative workflow management is investigated through an inter-enterprise PCB product design. ACWP facilitates PCB product design and team interaction in a collaborative but distributed product development environment and moves up the whole performance of design process.

Does Business Format Matter? Performance Measurement and Internet Retail Format

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The purpose of this paper is to investigate performance measurement implemented by Internet retailers, its variation in terms of business format, and its potential effect. A mail survey among UK Internet retailers produced 252 usable responses of small and medium-sized businesses. The results indicate that Internet retailers without store presence are likely to have higher complexity of performance measurement than those with store presence. The potential effect of performance measurement to improve business performance was also observed. The results are limited to UK small-and-medium-sized Internet retailers, selling tangible goods. The study suggests Internet retailers to measure various aspect of their performance because of its potential impact in improving operational performance. The paper has contributed to enhance the understanding of performance measurement in e-commerce firms and its impact on performance.

Using UTAUT to Explore the Behavior of 3G Mobile Communication Users

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¹I-Shou University, Taiwan

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³I-shou University, Taiwan

Although Taiwan's 3G services started its operation in 2003, the main profit source for every telecommunication company is still the cheaper fees of airtime minutes. Therefore, this study is directed on how these companies design the marketing tactics closer to the consumers' need under the dual influences of the decreasing individual's contribution and the low utility rate, as

well as how to improve customers' willingness to adopt 3G mobile telecommunication services. Unified Theory of Acceptance and Use of Technology (UTAUT) is used as the model to carry out expert interviews and consumers' questionnaire investigation. This study found that the factors that significantly influenced the "behavioral intention" include "performance expectancy," "social influence," and "facilitating conditions," while the traditional known "effort expectancy" did not. Moreover, three non-assumed relationships were discovered during the Structural Equation Modeling analysis, which helped to revise the UTAUT model for 3G telecommunication services. The results of this study can be helpful to Taiwan's mobile telecommunication companies to adjust their corporate strategies and tactics for providing customer-oriented 3G services to both existing and potential customers, such that the overall 3G market can be expanded as well as a win-win situation for the 3G industry and their consumers can be achieved.

Investigating Customers' Decision to Accept E-banking Services

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E-banking has been defined as providing banks' customers with banking services through a variety of tools except the banks' branches. Nowadays, e-banking services in Iran are being offered through A.T.Ms, Telephone Banks and in some banks, Internet Banks. Understanding and perceiving the individuals' intention to use these electronic services and the drives and motivations which cause the intention to use it can help Banks and other kinds of financial institutions in setting the appropriate marketing strategies for e-banking services. In this research, a model has been offered based on Theory of Planned Behavior (TPB) by using some other previous research findings, and it has studied to evaluate the intention toward the electronic banking acceptance in well-developed financial city. In this study, it has been cleared that the relationships that have been found are relatively justified partially by theory of planned behavior. Other study results can be useful for strategic planning of IT in banking.

A Study of Collaborative Product Commerce by Co-citation

Analysis and Social Network Analysis

Chyan Yang¹, Szu-Hui Wu¹, Joahanna Lee¹

¹National Chiao Tung University, Taiwan

The study presents the analysis of Collaborative Product Commerce documents associated by using co-citation analysis and social network analysis. Co-citation is a new form of document coupling the frequency with which two documents are cited together. In this paper we report an experiment by using data from Google scholar search and Social Science Citation Index to identify clusters of highly interactive documents in the subject of Collaborative Product Commerce. They may provide a new approach to indexing and to the creation easier search CPC area. The study discovers five core papers which imply the four documents provide insight into the theory's evolution and clarifies future research work in CPC field. The trend in the field focuses on organizational layer, included knowledge management, system problem solution, and collaborative mechanism design. The conclusion can provide future research direction for the researcher in this field.

Session	B (13:30 - 15:00)
Topic	E-Business and E-Commerce (2)
Date	Monday - December 3, 2007
Room	Jupiter I
Chairs	Virgilio Cruz-Machado and G. Gunawan

Stochastic Management for Randomly Broken Multi-channel Servers for E-commerce Applications

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This paper presents the stochastic management methodology to determine the decision points in an e-commerce setting, specially online shopping. The system deals with the multi-server system with regard to the "shopping time" (or human factor) that is spent by the customer who wants to buy something online. This theoretical approach is more practical and realistic than the single-server system. Explicit formulas obtained demonstrate an easy usage of the main stochastic characteristics and the stochastic optimization of these objective function.

HPRS: A Profitability Based Recommender System

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In electronic commerce, recommender systems are popularly being used to help enterprises for satisfying customers' individually diverse preferences. These systems learn about user preferences over time and automatically suggest products that fit the learned model of user preferences. In tradition, recommendations are provided to customers based on purchase probability and customers' preferences, without considering the profitability factor for sellers. This work presents a new profitability-based recommender system, HPRS (Hybrid Perspective Recommender System), which attempts to integrate the profitability factor into the traditional recommender systems. Comparisons between our proposed system and traditional system which only considers the purchase probability clarify the advantages of our system. The experimental results show that the proposed HPRS can increase profit from cross-selling without compromising recommendation accuracy.

An Empirical Study on Influencing Factors of Enterprise Recruiter's Conditional Brand Choice of E-recruiting Provider

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²Zhejiang Wanli University, China

³Fudan University, China

In China, the E-recruiting market has been developing very fast with intense competition. However, the extant literature has provided little insight into the enterprise recruiter's brand choice of E-recruiting. Based on combination theory of brand credibility and brand choice in an E-recruiting context, this paper examines the influencing factors of enterprise recruiter's conditional brand choice of E-recruiting provider through an empirical survey of 108 (potential) users of E-recruiting. Factors including expertise, trustworthiness, perceived risk, perceived quality, information costs saved and perceived value are considered. With multiple linear regression and logistic regression, interesting implications for practitioners and academics are discussed.

Recent Development of Recommender Systems

Cheng-Ting Wu¹, Hsiao-Fan Wang¹

¹National Tsing Hua University, Taiwan

Electronic commerce (EC) has become an important support for business activities. Through the WWW, EC provides an efficient platform for interchanging the information between business and business (B2B), customers and customers (C2C); and customers and business (C2B). However, how to make use of huge amount of transaction data and identify potential customers on the internet remains a challenge for an EC company. We review the recent studies on recommender systems and present an overview. We also propose a conceptual model to improve the performance.

Consumers' Perceptions of Uncertainty and Risk Factors Related to Electronic Insurance Services

Sanna Nenonen¹, Jouni Kivistö-Rahasto¹

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Electronic insurance services have been available to consumers in Finland only for the past ten years. Due to this, consumers are more used to arranging their insurance in branch offices or by phone, and they have not adopted Internet insurance services as eagerly as other services provided on the Internet. One reason for this slow adoption is that consumers perceive uncertainty and risk factors related to electronic insurance services. This paper presents the results of a survey concerning the use and reasons for non-use of insurance services available via the Internet. Among the respondents, the most commonly used electronic insurance services were information searches, price comparisons and coverage examinations. The most used services were desired to be available via Internet also in the future. The users of electronic insurance services were mainly active and experienced Internet users. These respondents with previous practice in the use of electronic services perceived lower risks in electronic insurance services than respondents making less use of Internet. Among the respondents, the most common reasons for not using insurance services provided on the Internet were lack of personal contact and the possibility of making wrong choices. Respondents also highlighted their doubts about the safety of electronic business in general and the usability of electronic insurance services.

Session	C (15:30 - 17:30)
Topic	Advanced Statistical Process Control
Date	Monday - December 3, 2007
Room	Jupiter I
Chairs	Philippe Castagliola and Zhang Wu

A Model-Free Design of Xbar Charts for Unknown Autocorrelated Processes

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We consider the design of Xbar control charts, assuming that the quality characteristic measurements follow an unknown autocorrelated process and a set of Phase-I in-control data are given. Our Xbar-chart procedure sets the centerline at a known in-control (or target) mean and control limits at k standard deviations away from the centerline, where the standard deviation of Xbar is estimated by the NBM (nonoverlapping batch means) method using the Phase I data. We propose a model-free method for computing the design parameter values: the batch size, sample size, and factor k . Simulation results show that the model-free design performs well, especially when the correlation is small or when the correlation is large but the mean shift is small or median.

Comparisons of the Symmetric and Asymmetric Control Limits for Xbar Charts

Huiifen Chen¹, Wei-Lun Kuo¹
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This work compares the Xbar chart performance for the symmetric and asymmetric limits. The Shewhart Xbar control chart is useful in detecting a shift in the process mean. A conventional way of setting the control limits is using a set of symmetric limits, e.g., the 3-sigma limits. Despite literature of constructing asymmetric control limits for skewed distributions exists, none has compared these two kinds of limits on an equal basis.

We compare the out-of-control ARL (average run length) for symmetric and asymmetric limits while keeping their in-control ARL values the same. Two testing examples are used: gamma and Johnson unbounded distributions. Our empirical study shows that if the quality characteristic has a right skewed distribution, the symmetric limits perform better than the asymmetric limits when the process mean shifts to a larger value and worse otherwise. Analogously, if the skewness is negative, the symmetric limits perform better than the asymmetric limits when the mean shifts to a smaller value and worse otherwise. None fully dominates the other. Therefore, even when the quality characteristic has a skewed distribution, the choice of symmetric or asymmetric limits depends on the directions of the shift and skewness.

Can a Variable Be Monitored by an np Chart Effectively?

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This article proposes a new np control chart, called the np_x chart, that employs an attribute inspection (inspecting whether a unit is conforming or nonconforming) to monitor the mean value of a variable x . The distinctive feature of the np_x chart is using the statistical warning limits to replace the specification limits for the classification of conforming or nonconforming units. By optimizing the warning limits, the np_x chart usually outperforms the np chart considerably on the basis of the same inspection cost. In addition, the np_x chart often works as a leading indicator of trouble and allows operators to take corrective action before any defective is actually produced.

The Efficiency of the EWMA Capability Chart

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²Lulea University of Technology, Sweden

In order to monitor unstable but capable processes Castagliola & Vannman have recently suggested a procedure based on an EWMA approach, called EWMA Capability Chart, for monitoring Vannman's $C_{p(u,v)}$ family of capability indices and showed how

their proposed approach efficiently monitors capable processes by detecting a decrease or increase of the capability level. The goal of this paper is to investigate the efficiency of this capability chart by computing optimal EWMA parameters yielding the smallest possible ARL's. The method for computing the ARL is explained and a table summarizing optimal values for the EWMA parameters is given for the Cpk chart.

The Average Run Length of Shewhart Style Control Chart under Normal Fuzzy Random Environments with Trapezoidal Membership Function

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²Chaoyang University of Technology, Taiwan

Due to the globalization impacts modern manufacturing environments are inevitably complicating and evolving, which is random fuzzy in nature. Therefore, the mathematical treatments in statistical control charts have to deal with the coexisting random and fuzzy uncertainties. Fuzzy mathematics created by Zadeh [5,6] is possibility measure theory based and the treatments are at fuzzy set level which is difficult to handle. The new fuzzy theory founded by Liu [2] is axiomatic based which convert fuzzy set variable into a scalar fuzzy variable and thus makes the fuzzy mathematical treatments behave similar to those in standard probability theory. In this paper, we introduce the new fuzzy theory-credibility measure theory into the analysis of the average run length (abbreviated as ARL) analysis of Shewhart style statistical control chart under normal fuzzy manufacture environments.

The Effect of Measurement Error on the Performance of the CUSUM Control Chart

Petros Maravelakis¹
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Control charts are a useful tool for identifying when a process is out of control. Cumulative Sum (CUSUM) control charts are used to detect small or moderate shifts in a process. Measurement error affects the ability of a chart to detect an out of control situation quickly enough. In this paper, we study the performance of CUSUM charts for the mean under the presence of measurement error using a model with linear covariates.

The EWMAS Control Charts with Estimated Limits: Properties and Recommendations

Giovanna Capizzi¹, Guido Masarotto¹
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Zhang extends the traditional EWMA control chart to the case of stationary processes, showing how the control limits can be analytically adjusted as a function of the process variance and autocorrelation. When parameters are unknown, the author also suggests how to estimate the control limits. Zhang's proposal is operationally simple and fully automatic. For this reason, it looks quite appealing from the practitioner's point of view. However, the impact of parameter estimation on the chart performance is not investigated. Since charts designed using estimated parameters can have an unsatisfactory behaviour, we study the impact of the estimation errors and give practical recommendations on the smallest sample size for which satisfactory accuracy is obtained.

Economic Design of Integrated Time-Between-Events Chart System with Independent Quality Characteristics

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This article presents the economic design of the integrated control chart system consisting of several individual time-between-events (TBE) charts for monitoring time between successive events in different process stages in a multistage manufacturing system. The design of the integrated chart system has been illustrated through an example. The proposed control chart system is easy to understand and operate, and thus the floor operators can utilize and understand it as easily as for the traditional system.

Session	A (11:00 - 12:30)
Topic	Project Management (1)
Date	Monday - December 3, 2007
Room	Jupiter II
Chairs	Yongyi Shou and Amnon Gonen

An Approach for Testing the Feasibility of Decomposing Interdependent Design Tasks for Concurrent Engineering

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Concurrent engineering process is characterized by executing a large number of interdependent project tasks. One effective way of managing such tasks is to decompose them into groups. However, not all tasks are decomposable. Without the need to apply a decomposition method, this paper describes a simple quantitative approach to test whether an underlying pattern of relationships exists between interdependent design tasks, such that they may be rearranged into groups. In addition, a grouping efficiency index for predicting the goodness of the best possible obtainable decomposition is introduced. The proposed approach and the grouping index were applied to simple hypothetical projects and a sample project adapted from the literature. Both the approach and the grouping index are proved to be powerful yet very easy to use.

Using Robust Portfolio Modeling for Selecting of New Product Development Projects - A Case Study

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One of the challenges in project portfolio management is lack of perfect information for project evaluation. On the other hand, in order to decide which project portfolio to be selected, only the results of a mathematical model can not be relied. One of the methods which puts the imperfect information in the model and considers the possibility of modeling the preference of decision makers through interactive operation is Robust Portfolio Modeling (RPM). This paper tries to analyze the experiments of implementation of RPM in a software engineering company and presents some recommendations for better implementation in New Product development (NPD) projects.

The Assessment of Bidding Strategy of Iranian Construction Firm

Behzad Esmaeeli¹, Mehdi Ravanshadnia¹, Mohammad Taghi Banki¹
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Arriving at the final bid price is a critical decision which is mostly done through experience and intuitions. As, many factors affect the final proposed price, no quantified decision processes may lead to irrational low or high proposed prices. Therefore, various attempts have been done to propose systematic models to track and analyze the bidding trends. This paper focuses on the previous trends of the bidding prices to estimate proper bidding cost in the Iranian construction industry. The prices might be influenced by environmental characteristics such as competitors' policies, the number of tendered projects, the number of contractors competing in the current tender, project characteristics, and the client. The subject of bidding price can be investigated through the client view or the contractor view. This paper attends the second approach.

This paper presents a quantitative analysis of impact of number of bidders on project bid prices. The study found that increasing the number of bidders will result in decreased project bid prices.

Estimating Design Effort in Product Development: A Case Study at Pratt & Whitney Canada

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The design effort required in a project, not only impacts the final cost, but also the project lead-time. This paper presents a case study carried out with the collaboration of Pratt & Whitney Canada, a global leader in the design and manufacture of aircraft engines. The study uses a parametric model for the purpose of design effort estimation of an integrated blade-rotor low-pressure compressor (IBR LPC) fan. The model estimation is compared with the actual project performance, and results demonstrate good estimation of the design effort. The impact of various factors used for design effort estimation is also discussed. Finally, the usefulness of the model is demonstrated.

Differing Roles of Axiomatic Design and Design Structure Matrix in Reducing System Complexity

Yee Soon Lim¹

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Large-scale systems are often complex. A major contributing factor to their complexity is the numerous dependencies between components. Manipulating a component disrupts other components, and vice versa. This impedes system development, maintenance, and modification. To reduce system complexity, it is essential to minimize and manage these dependencies. Axiomatic design (AD) and Design Structure Matrix (DSM) are methods that have the capability to accomplish this. Apparently, AD and DSM are similar. Both compute dependencies in matrix form to systematize dependency analysis. In reality, they are fundamentally different, and as we demonstrate below they may complement each other. AD minimizes dependencies between system functions. Many of these dependencies are caused by inappropriate system parameters, and they can be eliminated by changing the parameters. However, certain dependencies are inevitable, as they are inherent due to the laws of physics and logic. DSM can then be employed to manage such dependencies by manipulating the system parameters into a modular architecture. In short, AD eliminates avoidable dependencies, whereas DSM manages the remaining inherent dependencies. This study explicitly demonstrates the different roles of AD and DSM in reducing system complexity. We used a mechanical system as a hypothetical case study.

Session	B (13:30 - 15:00)
Topic	Project Management (2)
Date	Monday - December 3, 2007
Room	Jupiter II
Chairs	Hamdi Bashir and Hongbo Wang

Developing a New Structure for Determining Time Risk Priority using Risk Breakdown Matrix in EPC Projects

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Managing the effects of risks on projects is known as a key factor for successful project management. In this paper, a new structure is introduced to measure the risks. By combining RBS (Risk Breakdown Structure) – a classified set of all the risks of the whole project- with WBS (Work Breakdown Structure), a new matrix called RBM (Risk Breakdown Structure) is constructed. RBM indicates the impact of the risk resources on work packages (WPs). Here, for better consistency with the nature of EPC projects, the structure of RBM is modified to give a better image of the project components affected by time risks. In addition, the way of measuring the risk number is modified and an improved RPN (Risk Project Number) is produced which considers the time delay and the slack of activities which intensify or compensate the risks. Such modification provides a more reliable tool to decide which parts of the projects should be focused so that the risks are controlled. This methodology was applied in a typical Power Plant's EPC project and the results in terms of measuring the time risks have been reported to be reasonable.

A Team Building Approach for Competency Development

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An approach for multidisciplinary team building is proposed through three steps. We suppose that tasks and team members are characterized by a set of attributes (technical competencies). First, the calculation of distance measure between task and team member (profile matching) are proposed. Second, an array-based clustering algorithm is used as an effective means for providing an alternative solution in task and team-member clustering. The proposed approach generates a systematic formation of task and team member families by sequencing the rows and the columns of a task/ team member incidence matrix. Finally, an integer programming model is formulated to solve the task assignment problem. The proposed method is demonstrated by applying it to an example in a team building problem.

A Preliminary Study of Meeting Flow Management for Software Project Development: the Prototype (MfPMIS)

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This paper presents a Web-based software tool, MfPMIS, for facilitating and institutionalizing the collaborative project management environment. The software tool is constructed based on the meeting flow concept, an idea of managing software projects by the meetings and their contextual flows.

MfPMIS is a prototype of meeting flow concept that elaborates process-oriented project management. It models ad-hoc formal or anonymous meetings during software project development and provides better managerial resolution on projects by managing the meeting flows.

A New Formula to "Estimate at Completion" of a Project's Time to Improve "Earned Value Management System"

Hossein Iranmanesh¹, Navid Mojir², Salman Kimiagari²

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This paper presents a new method for Estimate at Completion (EAC) of project's time to improve earned value management system (EVMS). The new formula established consists of four variables: Scheduled Performance Index (SPI), Scheduled Percent Complete by Duration (SPCD), Actual Percent Complete by Duration (APCD), and Sum of Durations to Due Time (SDDT). The model has been validated by a simulation study using a progress generator program for typical RCPS problem project library. This program was developed in VBA-MSP and it included some basic assumptions and data were generated day by day randomly. The results show a strong linear relationship between response variable and above four predictors. Therefore, it can be concluded that the model could be used in a wide range of projects for EAC estimation.

Planning with Uncertainties for a Heritage Building Restoration Project in Calcutta, India

Shion Guha¹

¹Jadavpur University, India

Planning for a heritage building restoration project is complex because the scope of structural repair can be only ascertained during execution. In addition, workings with traditional materials that are not normally used presently create further difficulties in planning. The restoration for Great Eastern Hotel said to be the oldest hotel in India has been started in Calcutta, India and simultaneously, this study is undertaken to record the uncertainty of project duration and costing. A Gantt chart was prepared at the conception stage. Stakeholders were interviewed to estimate the pessimistic, mean and optimistic duration of each task in the Gantt chart. A Monte Carlo simulation based on a triangular distribution of the estimated time variations is conducted to estimate the statistics of duration. The Gantt chart is revised and simulation process is repeated with the progress of the project. The temporal distribution of time periods and associated deviations found from simulations are compared. Similar exercise is also executed for estimated costing at the various planning stages. The study indicates that a traditional Gantt chart estimate is not accurate for a project where a number of factors are unknown at the inception

An Interpretive Structural Model for Project Planning and Success

Parveen Farooquee¹, Javed Khan¹

¹Aligarh Muslim University, India

For any commercial project the primary responsibility of the project management is to plan and execute the project in such a way that it completes on time, utilises resources optimally, meets stakeholders' requirements, and has some future potential. Project planning is considered to play a significant role in the achievement of such goals. This paper attempts to identify the critical success factors of projects, with special reference to heating, ventilation and air-conditioning (HVAC) projects in and around New Delhi, and develop a structural model of relationships among those factors and between the factors of project planning and success. Interpretive structural modeling (ISM) technique has been used to arrive at the model. This model is expected to provide project managers with an appropriate approach of planning and executing their projects successfully.

Session	C (15:30 - 17:30)
Topic	Project Management (3)
Date	Monday - December 3, 2007
Room	Jupiter II
Chairs	Chung-Yang Chen and Jia Da Tang

A Bi-directional Ant Colony Algorithm for Resource Constrained Project Scheduling

Yongyi Shou¹

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The resource-constrained project scheduling problem is a typical combinatorial optimization problem. An ant algorithm with dual ant colonies is proposed to improve the effective allocation of project resources. The algorithm adaptively adjusts resource allocation according to the pheromone updated by artificial ants employed to search for feasible schedules. Two separate ant colonies are employed. The forward scheduling technique is applied by one ant colony while the backward scheduling technique is applied by another ant colony. The pheromone information of the two ant colonies is exchanged periodically to avoid early local convergence. An experimental testing indicates that the new design of two separate ant colonies with different scheduling techniques helps to improve the performance of resource constrained project scheduling.

Estimating Project Completion Times - Simulation and Analytic Approach

Amnon Gonen¹

¹Holon Institute of Technology, Israel

According to the PERT method, a project completion time is normally distributed with a mean equal to the critical path's length. The expected length of the critical path is the sum of the expected activities' durations of that path.

During the course of our research, we realized that in many cases the conditions of the Central Limit Theorem are not satisfied; hence, the project length is often not normally distributed. In other words, the expected project length is greater than the sum of the activities' duration along the critical path.

After several iterations of reducing the project length using the CPM method, we achieved a project network with several critical paths. The project length distributes according to the Maxima among all paths. In particular, the project length is longer than any critical path length.

We analyzed project completion time using both the analytic approach and simulation. Our results show that in many cases it is biased to use the critical path length when attempting to estimate project completion time.

The results of the current study provide users with better estimates and upper bound to the project completion time. These results can be used to improve risk management programs.

A New Approach for Buffer Sizing in Critical Chain Scheduling

Behzad Ashtiani¹, Gholam reza Jalali¹, M.Bahador Aryanezhad¹, Ahmad Makui¹

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The direct application of the theory of constraints (TOC) in project management is known as critical chain project management (CCPM) which is introduced by Goldratt. It is considered to be one of the popular approaches to project management. One of the most significant shortcomings in CCPM is the lack of mathematical analysis. Specifically, in buffer sizing step, Goldratt suggests using of 50% of critical chain lengths as a project buffer. Recently some approaches have been introduced to overcome this problem in CCPM. The fundamental research issues we address in this paper are the use of lognormal distribution for tasks completion time and integrate the risk of tasks in order to determine the parameters of distribution. In the next step a new method is proposed to size the buffer based on Root Square Error Method (RSEM) approach.

Development Projects Scheduling and Design Structure Matrix

Yan-Jun Qian¹, Thong Ngee Goh¹

¹National University of Singapore, Singapore

Many researchers have highlighted weaknesses of traditional approaches, such as PERT and CPM, in scheduling product development projects and in particular their failure to model iteration. The Design Structure Matrix (DSM) method provides a practical and useful tool to deal with this issue. The advantages of DSM representation and analysis techniques have led to their increasing use in project planning, and have spawn dozens of research efforts on organizing design tasks. This paper explores the nature of DSM approach, and reviews its recent development in design project scheduling. The paper also discusses limitations of existing DSM-based models, and proposes future research directions.

A Study on Program Evaluation and Review Technology Based on Cloud Model

Wen-zhou Yan¹, Jia Niu¹, Hui-yong Su²

¹Xi'an University of Architecture & Technology, China

²National University of Singapore, Singapore

When using Program Evaluation & Review Technology (PERT), we have to estimate the duration of the activity in the network diagram by our subjective experience. This kind of estimation has biggish subjectivity and uncertainty, so the error between the plan work and the actual work is very large. Cloud is a kind of uncertainty transiting model between some qualitative concept described by lingual value and its numerical value expression, uses Ex(Expected Value), En(Entropy) and He(Hyper Entropy) to represent the qualitative concept and integrates the fuzziness and randomness of the concept together, as well as constitutes the mapping between qualitative concepts and quantitative numerical values. Firstly, this paper introduced the principle of cloud model, then applied it to estimate the duration of the work activity in the network of PERT, and finally gave a case to illustrate its effectiveness. The application of cloud model into PERT can effectively resolve the uncertain problem of the work duration estimation under the traditional way.

Innovation and Factors affecting the Success of NPD Projects: Literature Explorations and Descriptions

Supachart Iamratanakul¹, Patricio Hernandez¹, Cesar Castilla¹, Dragan Milosevic¹

¹Portland State University, United States

This paper explores the innovation literature by focusing on technological evolution and revolution. Technological evolution is viewed in three perspectives: 1. the best time for new businesses to enter into markets, 2. the incumbents' response to the challenge from an entrant, and 3. the mortality of firms in an industry. The characteristics of each perspective are described in detail. The emphasis on the technological revolution is viewed as the comparison between sustaining technology versus disruptive technology. Critical success factors in New Product Development (NPD) projects are also described to look at how the differences of factors for achieving the success between NPD projects and other projects are. Finally, this research concludes that the alignment between NPD projects and innovation could be examined.

Study on the Funds Allocation of R&D Projects Base on Fuzzy Random Programming

Laixin Liang¹, Rufe Ma¹, Yuyun Huang¹

¹Central South University, China

Different with ordinary projects, R&D project is uncertain both in profit and in the possibility of success. Under this uncertainty, it is a difficulty for enterprises to allocate resource to maximize the expected profit. In view of this fact, this paper introduce a the logical growth function of the R&D project success probability, and integrate it with the uncertainty of profit, develop a fuzzy random expected value models to solve the difficulty of resource allocation in R&D project. At last, a heredity algorithm is designed in order to solve the fuzzy random expected value models.

R&D Project Management Standardization: An Empirical Research

Guilin Guo¹, Yidong Chen², Yuan Sun¹, Xiao-hong Zhou¹

¹Zhejiang University, China

²China United Engineering Corporation, China

Nowadays, it's increasingly important to reinforce R&D project management for obtaining enterprise's competitive advantage and development. The R&D project management standardization (PMS) is a significant method in the R&D project management, while it is a controversial issue, and therefore, it's necessary to conduct this research. In this paper, based on sample data of some Chinese enterprises in electronic manufacture industry, we establish a conceptual model, use paired sample T-test, correlation analysis, and multiple regression analysis (SPSS 13) to analyze how the R&D PMS affect the R&D project performance. We find: the effect of standardized project management (SPM) on the R&D project performance differs with the enterprise scale, i.e., SPM has no obvious facilitative influence on the project performance in the small enterprises, while SPM will increase the project performance in the large and medium enterprises; the intrinsic effect of the R&D PMS on the R&D project performance also differs with the enterprise scale. Finally, we present research conclusions and limitations, and some countermeasures & proposals to reinforce the R&D SPM, and thus improve the R&D project performance and promote enterprises' unceasing development.

Session	A (11:00 - 12:30)
Topic	Global Manufacturing and Management (1)
Date	Monday - December 3, 2007
Room	Jupiter III
Chairs	Ushio Sumita and Lin Gong

Modeling Organizations Based on Value Streams

Virgilio Cruz-Machado¹, Jose Tavares¹

¹UNIDEMI, FCT-UNL, Portugal

This paper seeks to present a methodology to assess performance and to provide management decision support. A “management by value streams” model was developed to assess company performance. It was implemented to support decision-making at an industrial company. The idea behind the model is that products or services should continually flow in the organization, as values streams. The model includes a set of metrics to measure the level of achievements versus previous established organization strategic objectives. The approach aims to promote the spirit of continuous improvement and collaboration, breaking the individual and segmented logic of the traditional distribution of work. The model leads to the definition of two integrated performance indicators: the Process Sustainability Index and the Organization Performance Index. These indicators provide an analysis on the level of performance of existing value streams, as well as on the organization, as a whole. This analysis will contribute to identify new improvement opportunities. The paper concludes that the model helps the implementation process of the organization strategy deployment: it works as an invaluable tool to act and to promote communication at the several organization levels.

Reference Process for Global Sourcing

Robert Alard¹, Josef Oehmen¹, Philipp Bremen¹

¹ETH Zurich, Switzerland

Global sourcing is gaining more and more importance. For European companies Asian procurement markets and especially China are becoming first choice procurement and manufacturing destinations. Global sourcing however poses a lot of challenges and risks for the buying company due to often very strategic implications of the procurement from suppliers located worldwide. Therefore the traditional strategic procurement process focusing on local or regional markets has to be adapted to cope with those challenges. In this paper we present an enhanced reference process for global sourcing including important strategic aspects related to the global sourcing.

Strategy Evolution and Market Leaderships: New Evidences from Semiconductor Memory Industry

Daw Ma¹, Jiang Yu²

¹Chung-Hua Institution for Economic Research, Taiwan

²University of Cambridge, United Kingdom

Strategy and structure viewpoints had a large impact on the historical research on corporate strategy and relative industrial evolution. The paper utilized the case of the semiconductor memory industry to provide a more holistic perspective to look into the underlying industrial dynamics. By analyzing history of leading DRAM firms and the dynamics of strategy, it will help us to understand the industrial evolution and vicissitude of firms.

Performance Value Analysis for the Justification of Lean Manufacturing Systems

Anand Gurumurthy¹, Rambabu Kodali¹

¹Birla Institute of Technology & Science, Pilani, India

Lean Manufacturing Systems (LMS) have attracted the attention of industries all over the world. But how do managers make a decision of implementing a ‘management based and people oriented philosophy and practice’ like LMS or a technically sophisticated system like Computer Integrated Manufacturing Systems (CIMS)? Such a question remains unanswered till date. Managers willing to adopt such systems should convince the top management with necessary justification, as it involves huge investment and creates a longstanding impact on various resources. But such justification problems are quite complex. Traditional techniques cannot be applied, as they do not account for intangible factors and benefits offered, which necessitate the use of Multi-Attribute Decision Making (MADM) models. Hence in this paper, an attempt has been made to demonstrate the application of a MADM model, namely, the Performance Value Analysis (PVA) to analyze the alternatives based on performance measures. A detailed algorithm of the PVA model is demonstrated using a hypothetical case situation, which showed that LMS is the best, as it results in overall improvement in the performance of the organization.

A Method of Optimum Product Platform Parameters Planning

Lingxuan Zhao¹, Ping Jiang¹, Xiaoyun Wang¹, Jianguo Ding¹, Runhua Tan¹

¹Hebei University of Technology, China

Mass customization, MC, needs to be realized in order to fulfill the requirements of customization and global competition. The product family design based on common product platform is an available means for mass customization, and the planning of product platform is the core and focus research in the design methodology of product family at present. In the categories of product family design approach, the model variable-based platform design is one kind of methods among them. As to a series of standard variable-based product platform planning, a method of optimum was brought out to satisfy a set of customer requirements. Without determining product common parameters and variable attributes beforehand, the proposed method focuses on improving the commonality of the product family within the satisfactory of the diverse customer needs, and then determines the variable product attributes and their numerical values, as well as the common parameters of product platform and their optimal value. This method of product platform planning is validated by a case study of Belt Conveyors designing.

Quantifying World-Class using AHP for Manufacturing Industries

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In recent years, there are some organizations, which are considered as world-class manufacturers, while many organizations are in the quest to attain the invincible status of being ‘world-class’. But an important question that has not been addressed yet is: “how to evaluate or assess an organization to deem it as world-class?” There is no literature available currently, which provides a methodology for the same. Hence, in this paper, an attempt has been made to quantify the term ‘world-class’ by identifying various factors/practices that need to be present and followed in world-class organizations. These factors/practices are assessed using a rating scale, which were aggregated and related to the updated list of competitive priorities, namely, morale, flexibility, innovation and social responsibility in addition the traditional priorities such as productivity, cost, quality, and delivery. To accomplish these activities, a Multi-Attribute Decision-Making (MADM) model, namely the Analytic Hierarchy Process (AHP) is used and the steps for the same have been demonstrated.

Session	B (13:30 - 15:00)
Topic	Global Manufacturing and Management (2)
Date	Monday - December 3, 2007
Room	Jupiter III
Chairs	Daw Ma and Shrees hail Pharsiyawar

The Synergetic Impact of Manufacturing Strategy Development on Operations Based Non-financial Performance

Chi-Horng Liao¹, Ming-Lang Tseng², Yuan Hsu Lin², Pi Lan Ho³

¹Ta-Hwa Institute of Technology, Taiwan

²Ming-Dao University, Taiwan

³Nanya Institute of Technology, Taiwan

This research analyses the link and synergetic impact between manufacturing strategy development and operations-based non-financial performance. The manufacturing strategy factors were identified through advanced management practices, advanced manufacturing technology and manufacturing flexibility. The research data were obtained from questionnaire survey with simple random sampling method in Taiwan food industry. A total 140 validated questionnaires were responded. Used of statistical approach to analyze the responded data. Implications and future study were discussed.

Analysis of Global Manufacturing Top 200: Applications of Zipf-Mandelbrot Law and Its Transposing Type

Qiang Wu¹

¹University of Science & Technology of China, China

Analysis of global manufacturing and management continues to be popular with academic researchers and industrial practitioners. Based on Fortune Global 500, this paper generalizes Global Manufacturing Top 200 in 2006 and in 2005. Then the research probes into the relation that the company's revenues are influenced by the rank change, and yields the Zipf-Mandelbrot law, which is an inverse power expression. Furthermore, in order to estimate the effect on rank of a change in revenues, this paper puts forward a more valuable and newer thought—transposing the independent and dependent variables of Zipf-Mandelbrot law, and the resulting estimated equation is also an inverse power expression actually. The research results show that, dealing with the rank of Global Manufacturing Top 200, we must notice the "inverse power effect" of the rank's alteration: when rank is top, it is harder to be raised or dropped; when rank is low, it is easier to be changed.

Impact of Skeleton Imports on Hollowing Out Production Bases Outside Japan

Ushio Sumita¹, Rina Isogai¹

¹University of Tsukuba, Japan

Many Japanese manufacturing companies have moved their production facilities partially or completely to China and other Asian countries, and the products produced at such oversea production bases are reversely imported into Japan. While this hollowing out production bases outside Japan enables them to reduce the labor and other operation costs, it incurs the extra logistics costs. In addition, the market lead time becomes inevitably longer, resulting in the increased inventory costs. In order to compensate these negative effects, certain Japanese companies have been implementing the SI (Skeleton Imports) strategy, where a variety of products in small quantity would be designed in such a way that a common frame (called Skeleton) can be used for all the products and various product specifications can be mounted onto the common frame to produce a variety of products in small quantity efficiently. The purpose of this paper is to analyze the positive effects of the SI strategy via simulation.

Multi-strategies Risk Programming for Virtual Enterprise Based on Ant Colony Algorithm

Min Huang¹, Xuejing Wu¹, Fuqiang Lu¹, Xingwei Wang¹

¹Northeastern University, China

The risks of virtual enterprises exist almost everywhere for they are dynamic, temporary and multi-partners. In order to restrict the risk to the acceptable level, the Multi Strategies Multi Choices (MSMC) risk programming model is proposed in this paper considering the fuzzy characteristics and project organization mode of virtual enterprises. There are many control strategies can be selected for each risk to reduce the global risk level of project in this model. In addition, the multi-layer strategies process mechanism and two properties, are presented in this paper. To solve this model, the ant colony algorithm is designed, which combines with the Fuzzy Synthetic Evaluation (FSE) embed HFMFs (Hyper-trapezoidal Fuzzy Membership Functions) evaluation. Simulation has shown that this method is both effective and efficient in achieving satisfied solutions for risk programming of virtual enterprises.

Japanese Techniques and Indian Manufacturing: Some Inferences

Jamal Farooque¹, Asit Mohapatra²

¹Aligarh Muslim University, India

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With rapid advancement in technology and availability of workforce at reasonable wages, India is becoming a preferred location for manufacturing companies from all over the world. The manufacturing sector in India has witnessed a growth of about 15 per cent during the year 2007. Japanese techniques like kaizen, quality circles, total productive maintenance, and just-in-time, etc. have been implemented worldwide by various manufacturing organizations to improve their performance and competitiveness. The extent of success achieved has, however, been influenced significantly by the structure and culture of the organization concerned and the country as well. The present article attempts to study the experiences of a few selected Indian manufacturing organizations, operating in and around New Delhi region, regarding the implementation and adaptability of popular Japanese techniques and practices (JTPs). A structured questionnaire containing both open and close-ended questions is used for data collection. The results are obtained using descriptive analysis, hypothesis testing, and coefficient of correlation.

Management Control System on International Outsourcing Manufacturing

Joel Koenig¹, François Geiskopf¹, Emmanuel Caillaud¹, Michel Sonntag¹

¹Institut National des Sciences Appliquées, France

International Outsourcing Manufacturing (IOM) is considered as motivation to establish strategic alliances. On this study we analyse one industrial framework between French and Asian company. Our thesis is to consider tacit resources to have a complete management control of the transferred process (production of a high speed machining center) to ensure a continuity of manufacturing product in a process clearly distributed.

Session Topic	C (15:30 - 17:30) The CATER System for Vehicle Mass Customization
Date	Monday - December 3, 2007
Room	Jupiter III
Chairs	Halimahtun Mohd Khalid and Martin Helander

The CATER Approach to Vehicle Mass Customization

Halimahtun M. Khalid¹, Manfred Dangelmaier², Tek Yong Lim¹

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CATER (Computerized Automotive Technology Reconfiguration) is a networked e-business system to support mass customization of vehicles. It is designed to enhance automotive industries in the use of information technology in several areas of vehicle planning and design. CATER delivers a suite of modules for use by end users to perform vehicle customization and planning over the Internet. In particular, CATER integrates customer citarasa, do-it-yourself design and MARk databases through a common semantic notation system to derive affective and user-centred design solutions.

Analytical Modeling and Evaluation of Customer Citarasa in Vehicle Design

Roger Jiao¹, Qianli Xu¹, Martin Helander¹

¹Nanyang Technological University, Singapore

Satisfying customer affective needs is arousing more and more attentions in product design. However, there is a lack of analytical rigor in reported work for addressing the affective needs. In this regard, this paper proposes a framework of analytical modeling and evaluation of customer Citarasa. The framework incorporates various decision-making techniques to (i) elicit customers affective needs, (ii) correlate the customer needs with the design parameters, and (iii) design product configurations to achieve a mutual benefit of customers and producers. The proposed method is applied in the design of car dashboard for demonstrating its capacity to addressing customer affective needs.

Citarasa Engineering Model for Affective Design of Vehicles

Martin Helander¹, Hong Peng¹, Halimahtun M. Khalid²

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²Damai Sciences Sdn Bhd, Malaysia

The research on affective design has expanded considerably in recent years. The focus has primarily been on consumer products, such as mobile phones. Here we discuss a model for affective design of vehicles, with special emphasis on cars. It was developed in CATER – a research program intended to support mass customization of vehicles. Cars are different from consumer products because they represent major investments, and customers will typically take about a year to decide what to buy. During this time the customer goes through several stages with different motivational content from Belief to Attitude to Intention and Behaviour. The model drives development of the citarasa engineering system.

Customer Requirement Analysis Based on an Analytical Kano Model

Qianli Xu¹, Roger Jiao¹, Xi Yang¹, Martin Helander¹, Halimahtun M. Khalid², O. Anders³

¹Nanyang Technological University, Singapore

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³Volvo Technology Corporation, Sweden

To facilitate effective analysis of customer requirements, the Kano model for customer satisfaction has been proposed to classify customer requirements based on survey data. However, traditional Kano is inadequate in quantitative evaluation and it lacks proper criteria for requirement classification. In this regard, this paper proposes an analytical Kano (A-Kano) model to address the key issues of customer requirement analysis. A set of Kano indices is defined to estimate customer preference based on quantitative measurements. Next, the Kano classifiers are defined as the criteria for classifying the customer requirements. The merit of the

classification is evaluated against a Kano evaluator, which is a shared surplus of customer-perceived utility and the producers' capability. The A-Kano model is expected to classify functional requirements into logical groups, which leads to an optimal tradeoff between customer satisfaction and producer capability.

Semantic Analysis of Verbal Communication in Cross-functional Design Team: A Study of Driver Seat Design in an Automotive Company

Xi Yang¹, Martin Helander¹

¹Nanyang Technological University, Singapore

The automotive industry has become highly networked to meet the challenging market demands. This requires improved communication in the cross-functional development team. CATER is a design philosophy that showcases the best practice of networked business and it addresses the communication in the cross-functional design team. This article describes a method based on latent semantic analysis (LSA) for measuring the semantic coherence between team members with different backgrounds in a cross-functional design team in an automotive company. The implication of this research and future work suggest a computational tool for detecting and diagnosing the non-functioning design teams.

Citarasa Based Vehicle Planning System

Tek Yong Lim¹, Halimahtun M. Khalid¹, Cheng Ni²

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This paper presents a citarasa based vehicle planning system, which is driven by the citarasa engineering model, as described in another paper in this symposium. The system is intended to support product planners of automotive companies in planning vehicle development, and forecast of new vehicle designs. Additionally, they can conduct online customer survey and analyze the data instantly. They can also find the most frequent citarasa descriptors used by customers in different market segments. They can also explore new citarasa descriptors. The system maps customer citarasa to design parameters via DECA method to generate optimal design solutions. The system is linked to the Do-It-Yourself Design system, to enable mass customization by customers.

Citarasa Driven Vehicle Configurator

Petri Helo¹, Sami Kyllönen¹, Roger Jiao²

¹University of Vaasa, Finland

²Nanyang Technological University, Singapore

Citarasa Driven Vehicle Configurator is a proposed approach on building configuration rules that allow users to convert soft preferences into production specifications and furthermore to bill-of-materials. This paper presents an example of computerized configuration system that enables the process from customer engineering to design and production stages. The configuration approach is based on combination of selective and generative rules and can be integrated with existing ERP systems.

Middleware Platform for Customizable Vehicle Reconfiguration

Pheichin Lim¹, YinChai Wang¹, Narayanan Kulathuramaiyer¹

¹Universiti Malaysia Sarawak, Malaysia

Although the automotive industry is relatively efficient in managing the production line, mass customization remains a major challenge. The difficulty lies in the establishment of channels to support customer feedback and interaction in directing the planning and design new products. There is thus a big gap between user requirements and product features. We explore the development of a platform for bridging this "semantic gap" between user needs and the decision-making process new product planners and designers. This paper presents the framework for this platform, which will then serve as a support for a mass customization system.

Session	D (11:00 - 12:30)
Topic	Technology and Knowledge Management (4)
Date	Tuesday - December 4, 2007
Room	Venus I
Chairs	Sardar Islam and Chia-Liang Hung

A New Weighting Method for Detecting Outliers in IPA Based on Choquet Integral

Hsiang-Chuan Liu¹, Chin-Chun Chen², Der-bang Wu³, Yu-Du Jheng³

¹Asia University, Taiwan

²Min-Hwei College of Health Care Management, Taiwan

³Taichung University, Taiwan

When interactions among items of survey exist in Importance-Performance Analysis (IPA), the traditional equal weighting method for detecting outliers in IPA is not always available. In this paper, we suggest use Choquet integral based on two fuzzy measures, the well known fuzzy measures, λ -measure, proposed by Sugeno, and ε -measure, proposed by our previous study, to improve this situation. A real data experiment by comparing the numbers of reduced outliers and the changing numbers of items which were needed improvement was conducted. The performances of traditional equal weighting method, λ -measure Choquet integral weighting method, and ε -measure Choquet integral weighting method for detecting outliers in IPA were compared. Experimental result shows that the ε -measure Choquet integral weighting method outperforms the other two weighting methods.

A Nonlinear Regression Model Based on Choquet Integral with ε -Measure

Hsiang-Chuan Liu¹, Wen-Chih Lin¹, Kai Yi Chang², Wei-Sheng Weng²

¹Asia University, Taiwan

²Taichung University, Taiwan

When the sub-tests of a composite test are with interaction, the performance of the traditional additive scale method is poor. A nonlinear regression model based on fuzzy integral with the well known fuzzy measures, λ -measure and the γ -measure proposed by our previous study can be applied to improve this situation. In this study, a real data experiment by using a 5-fold cross-validation mean square error (MSE) is conducted. The performances of two nonlinear regression model based on Choquet integral with γ -measure and λ -measure, a ridge regression model, and a multiple linear regression model are compared. Experimental result shows that the performances in order are the nonlinear regression model based on Choquet integral with γ -measure, the nonlinear regression model based on Choquet integral with λ -measure, the ridge regression model, and the multiple linear regression model.

Understanding the Behavioral Intention to Use ERP Systems: An Extended Technology Acceptance Model

Cigdem Altin Gumussoy¹, Fethi Calisir¹, Armagan Bayram¹

¹Istanbul Technical University, Turkey

Over the past few years, firms around the world have implemented enterprise resource planning (ERP) systems to have a standardized information system in their organizations. While millions of dollars have been spent on implementing ERP systems, previous research indicates that potential users may still not use them. This study, based on data from 75 potential end-users, examines various factors affecting users' behavioral intention to use the ERP system. The results indicate that subjective norms, perceived usefulness and education level are determinants of behavioral intention to use the system. In addition, perceived usefulness affects attitude towards use, and both perceived ease of use and compatibility affect perceived usefulness. Implications of these findings are discussed and further research opportunities described.

Knowledge Sharing in Product Development: A case study of a high-tech Company in China

Xian Guo Zhang¹, Jian Mei Yang¹, Wei Hu¹

¹South China University of Technology, China

The role of knowledge sharing, the cross-specialty and dynamically negotiated characters of knowledge sharing in product development context are discussed, and the problem of knowledge understanding is deeply analyzed. Based on a in-depth case study of a Hong Kong's high-tech company in China, the assertions deduced from the literatures are further confirmed, and some best practice of knowledge sharing in the subject firm are introduced.

Technique of Product Technology Evolutionary Potential Mapping Based on Patent Analysis

Jianhui Zhang¹, Huangao Zhang¹, Jianguang Sun¹, Runhua Tan¹

¹Hebei University of Technology, China

Intellectual property rights are an important driver of innovation and productivity in the knowledge-based economy. And the intellectual property rights in the form of patents provide a source of technological information that can be used by researchers and inventors to find new solutions to technical problems. Theory of Inventive Problem Solving (TRIZ) is a systematic approach that developed on the basis of patent information currently being applied internationally to find innovative solutions for technical problems. The patterns and lines of technology evolution that summarized from patent analysis of TRIZ are applied to identify evolutionary potential (EP) of a technical system and help decision-makers to make strategic decisions for product development. A searching method for EP is put forward and the method to construct the plot structure of EP is introduced. A sequential process of evolutionary potential mapping of product based on patent analysis is then formed. As an illustration, a butterfly valve case study shows the application of the process.

Research on the Mode of Firm's Technology Acquisition Based on the Growth of Technological Capability: A Case Study

Xinmin Peng¹, Guoqing Yan², Yingbo Zhou³

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To the firms in developing country, the enhancement of technological capability is realized by the technology learning. And the firms are expected to attain the best learning results only if the mode of technology acquisition continuously matches the technological capability. According to the extent to firm's R&D strength involvement, the mode of technology acquisition can be divided into three types including external purchasing, R&D cooperation and in-house R&D. The technological capability can be divided into three stages including technology imitation, system integration and endogenous innovation from the evolving aspect. A case of the dynamical matching between technological capability and technology acquisition of Ningbo Haitian Group has been analyzed. From the case, we concluded that the three stages of technological capability should be sequentially dominated by external purchasing, R&D cooperation and in-house R&D respectively and dynamically evolved with the growth of technological capability.

Session	E (13:30 - 15:00)
Topic	Technology and Knowledge Management (5)
Date	Tuesday - December 4, 2007
Room	Venus I
Chairs	Hsiang-Chuan Liu and Jason Woodard

Technology and Productivity – Why We Get One Without the Other?

Shreeshaail Pharsiyawar¹, Umesh Bhushi¹, Channappa Javalagi¹, Shivaprasad Dandagi²

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Technology has been the hallmark of human activity. It has become an integral part of our nature as a basic need for survival. Technology is driving the change at an ever-increasing rate, and has been accepted as a panacea for a better future. Thus technology has been given sovereignty over humanity. Human beings have become creatures of technology. When we evaluate the effects of technology, the results do not match to what was expected of it in this era of depleting resources. The productivity, effectiveness, efficiency too have not been as expected. The utility of technology, is yet another area of concern, considering its impact on biosphere. Technology thus still remains not only a poorly understood concept, but also incompletely tapped. Hence the need of the hour is conversion from creatures of technology to that of technology creatures. Also it is important to rediscover the nature and economy of technology. The paper discusses the technology and productivity as seen in the present perspective and proposes the systemic view of looking at the same, which results in understanding and the successful use of technology.

Technology Transfer to China in Automobile Industry: Difference between Japanese and Western Firms

Shucheng Han¹

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Based on data from case studies conducted in China, this paper compares the technology transfer styles of Japanese and western firms in China's automobile industry. The main focus is upon differences in the extent of these firms' integration into China's innovation systems through technology transfer. This study shows that although both Japanese and western firms are taking roots in China's economy western firms develop more linkages with Chinese indigenous firms. Japanese firms are less integrated into China's innovation systems. This paper explores the reasons for this and some of the consequences and implications both for business management and for the development of automobile industry in China.

A Study on the Evolution of Technological Capability Based on Technology Import: A Case From Yizheng Chemical Fiber Company Limited

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How to open the black box on process from technological learning to improvement of technological capability for technology recipient is heated discussed in educational and industrial circles. Reviewing literature available, this paper studies technical introduction, which is based on capital trade. The research constructs a triple helix model of the evolution of technological capability for technology recipient through integrating three chains of interaction, i.e. technological learning, knowledge conversion and integration and improvement of technological capability. The model is further justified by anatomizing the case study on Sinopec Yizheng Chemical Fiber Company Limited (SYCF).

The Relationship between High-Technology Export and Low-and-Medium-Technology Export: Evidence and Policy Implications

Qiang Wu¹, Juan Zhou¹, Liang Liang¹

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This study attempts to find the quantitative relationship between high-technology (HT) export and low-and-medium-technology (LMT) export. We take the data from the website of World Bank and select 86 economies (countries and regions) in 2005 to explore the problem from three aspects. The research results show that there are significant relationship of ln-ln model between HT exports and LMT exports, between HT exports per capita and LMT exports per capita, and between HT exports and LMT exports per capita (every p-value of F-statistic is less than 0.001). In each relationship, the former is the dependent variable, and the latter is the independent variable. The coefficients of independent variables are 1.194, 1.250 and 1.232 respectively. And the ln-ln model fits better than other common regression model. In order to draw more valuable conclusion, this paper adds two dummy variables into the three ln-ln models: one is population; and another is income. Based on the empirical study of six models, a main policy implication is that for HT export, the support effect of LMT export is clear, and economies of different types have the obvious difference. When policy makers emphasize the importance of stimulating HT export, they should pay more attention to the significance of strengthening LMT export.

A Research on Coordinated Development Relationship of Technical Standard, Intellectual Property and Technical Innovation

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The paper explores the cooperative evolution of technical standards, intellectual property and technical innovation. The research shows that technical innovation promotes the integration of technical standards and intellectual property; conversely, the integration exerts double-edged influences over technical innovation, sometimes beneficial, while other times hindering. To win the market by standards, the three factors should develop coordinatively to achieve a sound production cycle, as well as to increase the core competitive strength of the main body of technical innovation. Market-orientation, standard-advancing, and balanced interests are key to the cooperative development of the three factors.

Measuring the Constructs and Mechanism of the Value Co-creation System with Customers

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²Huazhong University of Science & Technology, China

Involving customers to co-create value is an important strategy for businesses competing to satisfy personalized customer demands and to gain competitive advantages. However, the research of co-creation value with customer is still in an early stage. In a search for this new competitive strategy, the literature on value co-creation largely overlooked constructs development and the interaction mechanism among the constructs. Using empirical data collected in the middle of China, this study provides an empirical examination into the mechanism of the unique constructs in a co-creation system and makes the contribution in the following three aspects. First, this study developed and assessed three constructs in a value co-creation system based on the empirical data. The measures satisfy key measurement criteria including unidimensionality, convergent validity, discriminant validity, and reliability. Second, the results of this study evidence that the emphasis of co-creation with customers may not only positively impact on customerization capabilities, but also directly impact on service capability. These capabilities are significantly different from those generated from traditionally isolated value creation system. Third, the study finds the relationship between the customerization capabilities and service capabilities. Customerization capability significantly differs from the traditional capabilities, and has positive impacts on firm's service capabilities.

Session	F (15:30 - 17:30)
Topic	Technology and Knowledge Management (6)
Date	Tuesday - December 4, 2007
Room	Venus I
Chairs	Marko Torkkeli and Myung Hwan Yun

Knowledge Modelling for Supporting Decision Making in Optimal Distributed Design Process

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A methodology for distributed knowledge modeling to support design problems analysis will be presented in this article. It will contribute to a better decision making during design problems analysis. An optimal design process refers to setting up coherent numerical models and it requires a well structured problem definition. However, a lack of downstream information in early stages of product development leads to a complicated elicitation task that became an issue due to nowadays distributed environments. A Multi-Agent approach is proposed to support the distributed knowledge elicitation process. A set of agents will guide members from the distributed design team, throughout the product life cycle, to extract relevant information and analyze it. The interaction among agents will highlight potential incoherencies during the modeling process, in order to enable partners to avoid inconsistent information. A coherent knowledge base is then constructed and ready to be used to create models to be analyzed by traditional inference engines such as Optimization solvers, Constraint Satisfaction programming, etc.

Recognizing the Core Technology Capabilities for Companies through Patent Co-citations

Hsiao-Chung Wu¹, Hung-Yi Chen¹

¹Chaoyang University of Technology, Taiwan

Companies, when crossing licenses with partners, are required to grasp not only their own, but also their partner's, core technology capabilities (TCs). Much effort has been devoted to identifying potential core TCs for companies. However, little research addresses the issue of recognizing existing core TCs for companies and their rivals. Without understanding of existing core TCs, companies cannot undertake feasible and comprehensive strategic R&D planning. Patents provide an objective and public source to understand core TCs of companies. In this paper, we propose a method to investigate core TCs through the co-citation structures in the patents. The proposed method considers the citation frequency and the age of the patent, to avoid identifying older core TCs. The method is demonstrated by recognizing core TCs for Taiwan Semiconductor Manufacturing Company (TSMC). The results show the core TCs for TSMC are found in not only in the semiconductor manufacturing process, but also in production control.

An Evaluation System based on Concepts and Components of End-User Computing Competency

Chui Young Yoon¹, Keon Myung Lee¹

¹Chungbuk National University, South Korea

In a computing environment, the computing capability of the end-user mostly influences the performance of individual business tasks. It needs the evaluation and management of the end-user computing capability. This study presents an evaluation system that comprises an evaluation model, evaluation method and process. The evaluation model has four evaluation domains and evaluation items. The model construct was verified by factor analysis and reliability analysis through the pilot test. The application of the developed system was confirmed by applying it to evaluating the end-users in a computing environment and presenting its results.

This system will contribute to developing a practical evaluation system and improving the end-user computing capability.

Knowledge management Barriers: An Interpretive Structural Modeling Approach

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The objective of this paper is to develop the relationships among the identified knowledge management (KM) barriers. Further, this paper is also helpful to understand mutual influences of barriers and to identify those barriers which support other barriers (driving barrier) and also those barriers which are most influenced by other barriers (dependent barriers). The interpretive structural modeling (ISM) methodology is used to evolve mutual relationships among these barriers. KM barriers have been classified, based on their driving power and dependence power. The objective behind this classification is to analyze the driving power and dependence power of these barriers.

Market Scope of Vendors in the OSS Software Market

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¹University of Jyväskylä, Finland

This paper studies the market scope of vendors that produce software for telecommunications operators, i.e. the Operations Support Systems (OSS) market. The aim is to find out the current strategies used by vendors in the OSS market. The market scope is studied on two dimensions: 1) the breadth of the scope in the OSS market; and 2) focus on the telecommunications industry. The breadth of market scope is divided into four categories: niche, vertical, layer and broad scope. We examine empirical vendor data from the years 2002 and 2005. Results show that all hypothesized strategies are present in the market. Most of the firms have either a niche, a vertical or a broad market scope, and they are specialized in telecommunications. The situation has not changed much from 2002 to 2005, but the number of vendors has decreased.

An Empirical Study on the Relationship between Alliance Network Environment and Knowledge Creation Capabilities of Tech-typed SME

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¹Taiyuan University of Science & Technology, China

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Along with knowledge economy emerging, the study on knowledge creation has become one of the focuses in the theoretical circles and enterprises. Most researches regard knowledge creation as a channel of digging internal innovation advantage from the perspective of one enterprise. However, the relationship between network environment and knowledge creation capabilities under the knowledge alliance network is not accounted for in the last researches. And the study uses statistic analysis method analyzes and demonstrate the relationship between alliance network environment factors and knowledge creation capabilities through collecting and analyzing the effective data that are from 300 SME.

Engineering Management or Management of Technology? A Bibliometric Study of IEEE TEM

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We tend to use the terms engineering management (EM) and management of technology (MOT) interchangeably. This paper tries to examine what these mean through a bibliometric study of IEEE Transactions on Engineering Management. As well as introducing bibliometric ideas, network analysis tools identify and explore central concepts covered by EM/MOT and their inter-relationships. Specific results to be presented will cover different levels of analysis and so show different dimensions which can be extracted from citation data:

- Co-word terms from article keywords used to identify themes
 - Journal title co-citation network: link MOT to other disciplines
 - Individual publications co-citation networks used to show concentrations of underlying themes and how they relate
- Citation patterns of publication titles show that MOT appears dominant in IEEE TEM and the discipline has a bridging role in integrating ideas from several distinct areas including innovation, NPD, strategy, organisation science and management science. The analysis further suggests that MOT essentially relates to the firm rather than policy.

The Assessment of Innovation Capacity of High-Tech Industries with the View of Sustainable Development: An Empirical Study in China

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The development of high-tech industries is an effective way towards sustainable development, which in turn means that the high-tech industries should be run based on the carrying capacity of resources. Innovation of high-tech industries in China, however, has been paid much attention to from the perspective of technological aspects such as input-output ratio, ignoring the effect on the environment. Figuring out the level of energy saving as one of important basis of innovation, this paper sets up a new assessment system of innovation capacity. Using the factor analysis model it assesses the innovation capacity based on the initial data of 30 provinces and direct-controlled municipalities in China. It is shown that eastern China's areas, especially Beijing, Yangtze River Delta and Pearl River Delta present higher innovation capacity of high-tech industries, whereas mid-west areas of China are in the dilemma with lower innovation capacity and weaker carrying capacity of resources. The gap between them is growing increasingly.

Session	D (11:00 - 12:30)
Topic	The Science in Service Development
Date	Tuesday - December 4, 2007
Room	Venus II
Chairs	Kay Chuan Tan and Yonggui Wang

The Antecedents and Consequences of Relationship Strength: A Disaggregated Approach in the Context of a Chinese Service Industry

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¹Nanjing University, China

²Macau University of Science & Technology, China

³Beijing University of Aeronautics and Astronautics, China

Relationship strength has become one of the focal concepts in relationship marketing and customer relationship management. Consequently, in practice, how to build strong relationship with VIP customers has become the priority of managers. However, little is known about how to strengthen the relationship strength with VIP customers and its consequences. This study, Based on an intensive literature review and empirical analysis, aims to bridge this gap by examining how to strengthen the relationship strength with VIP customers by taking a disaggregated approach and exploring the consequences of each dimension of relationship strength. Our empirical analysis also finds that relationship strength plays a full mediating role in the relationship between various customer relationship management activities and customer trust, customer satisfaction and customer perceived value.

Consumer Creativity, Participation and Satisfaction: The Influence of Domain Knowledge in Service Context

He Jia¹, Yonggui Wang¹

¹Nanjing University, China

Based on a conceptual model of the influence of domain knowledge on customer participation, consumer creativity and consequent satisfaction, three studies were carried out to empirically test some paths of the model, which contributes to a systematic maneuver for service providers to manage consumer creativity in their business.

Inter-functional Coordination for New Service Development

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This research endeavors to enhance the understanding of inter-functional coordination in the process of new service development (NSD). Through a mixture of inductive and deductive approaches indepth case studies are conducted involving five successful service organizations and fifteen NSD projects. The determination of coordination mechanism is a function of the degree of fit novelty and the NSD phase. A mixture of iterative and setbased concurrent engineering methods is used to increase the stability and precision of coordinated information. While the downstream activities are not flexible enough to cope with last minute changes from upstream, the organization aims to work in settings where the fast evolution of upstream information is possible. This paper bridges the gap in knowledge in the understudied research area: the applicability of coordination and concurrence methods developed for manufacturing product development to services, in particular, patterns of functional coordination for new service development and realization.

A Survey on Six Sigma Implementation in Singapore Service Industries

Ayon Chakrabarty¹, Kay Chuan Tan¹

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The concept of Six Sigma was initiated in the 1980s by Motorola. Since then it has been implemented in several manufacturing and service organizations. In case of services, health care and finance were major beneficiaries till now. The application of Six Sigma is gradually picking up in other services like; call centers, utilities and public services. This paper provides empirical evidence on Six Sigma implementation in service industries in Singapore. By using a sample size of 50 service organizations (10 responses are from organizations which have implemented Six Sigma), the paper helps in understanding the status of Six Sigma in service organizations in Singapore. The findings confirm the inclusion of critical success factors, critical to quality characteristics, tools and key performance indicators as observed from the literature. The revelation of "not relevant" as a reason for not implementing Six Sigma shows the need for understanding specific requirements of service organizations before its application.

Are Services Really That Valuable? Two Diverse Cases in an Intra-Company Technology Transfer Setting

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Services are currently receiving widespread managerial and academic attention. This study challenges the prevailing celebration of services by questioning the amount of value services can contribute to an offering. Service paradigm is approached in the telecommunications industry by utilizing qualitative research methods via two diverse cases in an intra-company technology transfer setting. The results indicate that services are regarded as essential and inseparable components to the technology transfer framework. Services can, however, create customer value only after the customer perceives the maturity of the transferred technology as sufficient. Further research should be directed to mapping the value paradigm in the technology transfer domain by covering other sources of value to formulate a holistic view of the provided value in technology transfers.

Services Science, Management, and Engineering: A Literature Review in the Perspective of Management Science

Hui-Fen Li¹, Jian-Jun Wang¹, Hong-Lei Yu¹, De-Li Yang¹

¹Dalian University of Technology, China

Although services science, management, and engineering (SSME) is a new topic to both academics and practitioners, there are still many literature available so far. Since the subject is at the stage of development, a review of the literature on SSME with the objective of knowing what have been done will initiate further research and develop potential opportunities. This paper reviews the literature on SSME using a suitable classification to identify the gap between ideality and practice and to suggest future research directions. The 32 articles on SSME are classified into five categories: SSME overview, services science, services management, services engineering, and SSME education. A comprehensive list of the referenced literature is presented. We hope that the findings of this study will provide useful insight into anatomy of SSME literature and be a good source for anyone who is interested in SSME. The paper also provides some future research and education suggestions.

Session	E (13:30 - 15:00)
Topic	Service Innovation and Management (1)
Date	Tuesday - December 4, 2007
Room	Venus II
Chairs	Tien-Tsai Huang and Qiang Lu

Motives, Trends and Effects in Cross-Border Acquisitions in the Finnish Technical Engineering Industry

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¹Lappeenranta Univ. of Tech., Finland

This study focuses on the technical engineering and consulting business which is a significant sub-sector of technology-related knowledge-intensive business services. The objective of the study is to explore the cross-border acquisitions – purchases and sales – of Finnish engineering consulting firms during the past decade 1997-2006 in terms of the amount of transactions and the geographical distribution of acquiring and target nations. The motives and intended effects of acquisitions were also studied and compared to literature reviews and general industry characteristics. For most parts, the results are in line with the literature reviews, showing that product and market extensions are the most significant motives for cross-border acquisitions. Instead, knowledge acquisition especially for promoting innovation and R&D capabilities is not so apparent in the motives. Moreover, the geographical distribution in the Finnish sample does not yet clearly indicate a global movement of the industry towards the east, e.g. Asia. However, the strategies for market extensions of these knowledge-intensive firms in many cases seem to be implemented by other types of organizational changes than cross-border acquisitions. The results of the study also provide several possibilities for in-depth further studies of the motives and effects of acquisitions and future comparative studies of other geographical areas.

Analyzing Customer Satisfaction and Service Level Using AI technique

Hsiao Ching Chen¹, Hui-Ming Wee¹, Yung-Tsan Jou¹, Yao-Hung Hsieh¹

¹Chung Yuan Christian University, Taiwan

“Attractive Quality” is a critical issue for enterprises to obtain survivability in the modern global environment. The consumer quality involved not only the tangible product quality but also the perceived service quality during the whole process from purchasing to consuming the service/products. Due to competitive market, many organizations began to investigate the gap between “Service Quality” and “Customer Satisfaction”. In this study, we test the gap between “Service Quality” and “Customer Satisfaction” using the survey data collected from the staffs and customers in a primary group of Taiwanese logistic industries based on the results derived with artificial neural network technology. Through the different service level aspects of customers and enterprises, we can eliminate the blind spot in the logistics industries so as to strengthen their competitiveness.

Eliminating Emergency Department Wait by BPR Implementation

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²Seton Hall University, United States

Escalating cost in health care industry and increasing demand of patients' satisfaction triggers hospitals in general to improve their performance. Emergency department is an important area where hospital management needs to increase its efficiency. This is due to the emergency nature of the patients and also the position of emergency department as the biggest contribution to the hospital admission. One way to yield higher efficiency is by applying Business Process Reengineering (BPR) which focuses on understanding the current processes before proposing relevant changes. This paper discusses a case study conducted at a Singaporean Hospital and investigates deeper on the current situation including characteristics of emergency department.

Complexities in Managing Technology and Operational Driven Solutions

Rajenlall(Raj) Siriram¹

¹Dimension Data, South Africa

Managers are faced with challenges to improve competitive advantage. Growth and operational improvement philosophies are apparent as strategies to improve competitive advantage. Growth philosophies include organic and inorganic mechanisms. Organic mechanisms are operational whereas inorganic mechanisms extend beyond the current boundaries of the firm. Inorganic growth focuses on growth through strategic alliances mergers, acquisitions, and joint ventures, etc. Operational growth includes adoption of methodologies like different problem solving approaches similar to just in time (JIT), total quality management (TQM), theory of constraints (TOC), etc. The objectives of these philosophies are firms outperform their competitors. This paper addresses some of the organic and inorganic methodologies that firms utilize to overcome challenges when striving towards competitive advantage. The paper focuses on four case studies showing how some firms may strive to achieve competitive advantages.

Analysis of Institutional Factors Influencing the Service Innovation - A Case of Chinese Software Industry

Weilin Zhao¹, Chihiro Watanabe¹

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China has experienced remarkable development in its economic growth over the last two decades. To sustain its economic ascent, a paradigm shift from manufacturing to service economy is considered to be important. In such a kind of change, Chinese software industry has achieved conspicuous development since the middle of the 1990s. With the background of rapid growth in economy and the diffusion of PC and internet, Chinese software industry has strengthened its domestic industry development and its export-oriented outsourcing service simultaneously. China is trying to be the frontier in the post-information times by service innovation. In this process, institutional framework has been playing some key roles. This paper tried to analyze institutional structure governing the potential of software development in China as a case study; thereby institutional factors influencing the service innovation were identified.

e-Government Reform and Shared Services in Taiwan

Johannes K. Chiang¹, Kenny Huang¹, Eric Yen¹

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Electronic Government (e-Gov) has been seen as the competitive edge for modernizing public administrations over last few years. e-Government program has been initiated in Taiwan years ago. Taiwan government has engaged significant efforts in the operation of e-Government program. The researchers as well as the government per se also identify e-Gov Shared Service will be the critical element in the new stage of the e-Government program. The goal of this article is to present the development and evolution of e-Gov Shared Service. Internal data from 2005 and 2006 through several governmental agencies was gathered and analyzed with regard of the demand of e-Gov Shared Service. This paper clarifies further the e-Gov. reform process and discusses the development issues, in particular those centric to consolidation. Among others, GRID, core services and a case on National Archie are clarified. At last, the paper summarizes the potential needs for Grid computing technology in the e-Gov Shared Service and e-Gov development.

Session	F (15:30 - 17:30)
Topic	Service Innovation and Management (2)
Date	Tuesday - December 4, 2007
Room	Venus II
Chairs	Ville Ojanen and Rajenlall(Raj) Siriram

Evaluating Customer Satisfaction Using Fuzzy Model Based on Flexible Expert Weight

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As the market is getting more competitive and the customers also require higher quality, customer satisfaction is becoming the most important factor that every industry must take note of. Many literatures reveal that the statistical methods are used to assess the level of customer satisfaction; the common statistical methods can generate some useful statistical data and inferences. However, among all the ways of gathering statistics and analysing, we are unable to deal with the problems that facing evaluating linguistic terms, such as good, comfortable, etc. Furthermore, while evaluation is conducted, most researches assume that all expert's weights are equal. In fact, it is more reasonable that different expert should have different weight depending on their experiences. In this paper, a flexible expert weight fuzzy model to evaluate the customer satisfaction applied on any kind of industries is proposed, which can be used as a tool to survey customer satisfaction. Furthermore, a numerical example is given to verify the results and show its advantages.

Research on Incentive Mechanism to Promote Energy Efficiency in Existing Buildings

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²Beijing Institute of Civil Engineering, China

Reconstruction of the existed buildings to improve energy efficiency is a key field of China energy efficiency strategy. In this paper, firstly, the author analyzes situations and problems of energy consumption of existed buildings in China; secondly, the author compares the energy efficiency measures of Chinese existed buildings with German existed buildings; thirdly, by referring to the German experiences on energy efficiency reconstruction in the existed buildings, the author studies the approach to promote energy efficiency of existed buildings; lastly, the author discusses the additional relative measures and provides some advices to governments. The goal is to promote the energy efficiency of existed buildings, and accelerate the execution of building energy efficiency strategy and realization of sustainable development in China.

Strategic Logistics, a Way to Evolve Towards a Lean Organisation

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¹QUALISEG, Portugal
²UNIDEMI, FCT-UNL, Portugal

Purpose – This paper attempts to show how Lean Thinking and Strategic Logistics concepts applied to Organization's design and structure can result on an effective and efficient approach.
Methodology/approach – Considering Strategic Logistics functions we developed and been testing a Strategic Logistics organization model in accordance with Lean Thinking principles.
Findings – This simplified organization structure with only two branches or dimensions – Logistics and Mission – eases the outsourcing of non-nuclear activities and establishes a proper framework to increase the focus on organization's core business.
With this approach a considerable advantages are supposed to be achieved, such as less activities, less processes less people and less costs. In addition, higher service level, effectiveness, efficiency, more flexible organization, and a better image are expected.
Originality/value – The work related to this paper is an attempt to implement Lean Principles in a superior level of organizations: the organization design level.

Researches on the Relationship between Mechanism of Service Innovation and Knowledge Creation in the Alliance Network

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In service economy time, the service elements of alliance network are playing more and more role in the course of improving competition advantage and network value. So, its service innovation mechanism is being paid more and more attentions by academia and business circles. Service innovation is increasingly becoming a strong strength to promote alliance network develop. In this paper, the relevant theories on knowledge creation, alliance network and service innovation are analyzed at first. On the basis of this, the relation model of between Knowledge creation and service innovation is set up, and the model

reveals function mechanism of service innovation. Meanwhile, it puts forward to theoretical direction and research method for practice activity of alliance network.

The Interaction based Innovation Process of Architectural Design Service

Jingbo Zhang¹, Yan Tao¹
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Architectural design service is a typical engineering and technical service, which belongs to the knowledge intensive business service. But until now, it has received little attention from both engineers and scholars. Based on the theories of service innovation process, this paper discusses the customer-interaction mechanism of Architectural Design Service tries to analyze the innovation process of architectural design service. We divide its innovation process into three stages, which are service concept stage, service development stage and service delivery stage. We also recognize the sub phases of each stage. Finally, this paper concludes some suggestion to the innovation of architectural design service.

Service Quality to Loyalty- Effect of Function and Facility

Vikram Singh¹, Sandeep Grover¹, Ashok Kumar¹
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Any organization, manufacturing or service aims at customer satisfaction by enhancing the value of its products or service facility. Quality of a product is subset of its value and is defined as "totality of features and characteristics of a product or service that bear on its ability to satisfy stated or implied needs". Thus value of a product or service is dependent on its capability to fulfill primary (stated need) and secondary functions (implied need). Enormous literature on service quality has identified various dimensions of service quality viz. tangible, responsiveness, reliability, assurance, and empathy. Service quality is an overall attitude towards a service firm. For instance, a customer may be satisfied with one service encounter, but the overall perception towards the service organization may be poor. The present work visualizes the quality of service in terms of its value to customers. The paper further identifies the factors responsible for 'quality of function' and 'quality of facility' for different service organizations. The interrelationship developed between various factors will help in deriving the conclusive effect of 'function and facilities' as these are responsible for success of any service organization.

Correlation Among Organizational Position Element with Corporate Governance's Character

Aries Susanty¹, Ubuh Buchara Hidayat¹
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The good corporate governance and the 7-S Model relates to the internal process approach. This approach emphasized a smooth, well-oiled internal function to achieve organization's target. To achieve organization's target, the good corporate governance and the 7-S Model are the parallel approach, which have relationship one to another. The relationship between the good corporate governance and the 7-S Model can be explained through the Pascale's Adaptation Model. In this model, every organization's element which is strategy, structure, system, style, staff, shared valued, and also skills have continuum. This continuum causes every organization's element tends to arise in predictable domain, match with condition faced by company. Pursuant to this matter, it enables also to place every certain organizational element in domain that is match with the good corporate governance character. This research use 12 hypothesis to test the relationship between strategy, structure, system, style, staff, shared value, and skills with attainment of the good corporate governance character. To test that hypothesis, this research uses 30 company as sample which consists of BUMNs and Non-BUMNs.

Lead Using or Lead Refusing? An Exploratory Examination of Open Innovation Activities by Lead Users in Mechanical Engineering

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Nowadays the importance of lead users as an important source for innovating new products or services is commonly acknowledged. Conventional accounts frequently elaborate upon ways of improving lead user integration with regards to opening up new avenues for further collaboration. Against this back-ground, this study concentrates upon qualitative data from the field of mechanical engineering, which suggest that companies oftentimes also deliberately try to refuse to engage with lead users. This unanticipated finding thwarts the supremacy of an uncritical integration of lead users, indicating that the extent to which lead users are integrated depends upon the nature of the product and the particularities of the relationship between the company and the respective lead user. The article concludes with a discussion, critical reflection, and options for future research.

Session	D (11:00 - 12:30)
Topic	Supply Chain Management (4)
Date	Tuesday - December 4, 2007
Room	Mercury I
Chairs	Sun Jing and Antonio Messeni Petruzzelli

Capacity Sourcing using a Reservation Contract

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In this paper we model a scenario where a buyer reserves capacity from one or more suppliers in the presence of demand uncertainty. We explicitly derive suppliers' capacity reservation price, which is a function of their capacity, amount of capacity reserved by the buyer and other factors. The buyer's decisions are how much capacity to reserve and from how many suppliers. Under conditions of uniformly distributed demand, we derive closed form solutions for the problem and show that the optimal number of suppliers to contract capacity from remains robust to changes in model parameters.

Purchasing Heuristic Algorithm for Minimizing Cost Related to By-size Inventory in Frozen Shrimp Industry

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In the shrimp market, shrimp can be categorized into six sizes, which are 30, 35, 40, 50, 60 and 80 pieces per kilogram. One of the common methods to purchase fresh shrimps, in the frozen shrimp industries, is to buy the whole farm from contracted farmers. The various shrimp sizes are obtained by this purchasing method. Purchased shrimps, whose sizes are not required by the customers, will be carried to the next periods. They are called the by-size inventory. In Thailand, the by-size inventory holding cost is considered as a major cost in frozen shrimp industries. Therefore, a good decision in purchasing the shrimp farms from contracted farmers is necessary in order to avoid excessive by-size inventory. In this paper, a mathematical model and an algorithm based on the mathematical model is developed to assist the frozen shrimp industries in contracted farms purchasing process. The objective is to minimize cost related to by-size inventory. The effectiveness of the heuristic was evaluated by solving a set of test problems with various parameters. The results demonstrated that the heuristic is quite effective and practical in solving the problem.

Tradeoff Between Expected Reward and Conditional Value-at-Risk Criterion in Newsvendor Models

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Two common approaches to addressing risk in the newsvendor setting are to maximize the probability of achieving a target profit and the newsvendor's expected utility, respectively. In this paper we introduce a weighted mean-risk objective. In particular, we consider the tradeoff between the expected profit and conditional value at risk (CVaR). The CVaR criterion measures the average value of the profit falling below a quantile level which is commonly known as the value at risk (VaR). We derive the optimal order quantities and discuss comparative static properties in terms of optimal order quantity, the weight used in the objective function and the degree of risk aversion of the newsvendor.

Buyer-Vendor Coordination Through Quantity Discount Policy Under Asymmetric Cost Information

Santanu Sinha¹, Sarada Prasad Sarmah¹

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Coordination between the buyer and the seller is one of the important issues in supply chain management. This paper investigates the coordination problem in a two-stage supply chain under uncertain cost information of the buyer (retailer). The aim of the paper is to design a coordination mechanism through quantity discount policy under asymmetric cost information that allows the system to perform as closely as that of under complete information. Fuzzy set theory is applied to estimate the uncertainty associated with the input cost parameters and triangular membership function has been used to analyze the model. Finally, the model is illustrated with a suitable numerical example.

Planning for Supply Chain with Seasonal Variable Delivery Time

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The fluctuation of the seasonal variable delivery time significantly impacts the operating costs of production and distribution systems. This paper finds that a non-linear deliver time function which has a non-zero second derivative can simulate the practical situation more than linear function which has a zero second derivative based on practical data. And this paper focuses on a supply chain in which the retailer requires a small-lot at a fixed interval, the manufacturer sets up a distribution center to satisfy the demand, and the manufacture facility is far from the retailer. A search algorithm for finding the optimal production lot and ordering quantity in a system of non-linear deliver times is proposed. The sensitivity analysis shows that cost savings can be achieved by planning production cycles according to the acceleration of deliver time changes and in-transit costs.

Trading options in Supply Chain

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³National University of Singapore, Singapore

Originally as a financial concept, options is introduced into supply chain area to improve the ability of handling demand uncertainty and hence seek better performance of the participants. We examine how options trading works in the market consisting of two retailers in both cooperative and non-cooperative scenarios. We find the optimal trading quantity is irrelevant to options price in both situations, only depending on their current inventory, options in hand and demand information of the second period. Using bargaining theory, we analyze the outcome of trading, as well as the impact on the participants' performance.

Session	E (13:30 - 15:00)
Topic	Supply Chain Management (5)
Date	Tuesday - December 4, 2007
Room	Mercury I
Chairs	Jing Wang and Szu Hui Ng

A Two-phase Algorithm for the Manufacturer's Pallet Loading Problem

Kun-Chih Wu¹, Ching-Jung Ting¹
¹Yuan Ze University, Taiwan

We propose a two-phase algorithm for solving the manufacturer's pallet loading problem (MPLP). A new integer linear programming model is developed to obtain the maximum number of items that could be packed onto a pallet in the first phase. The solution obtained in the first phase is then adopted to generate a layout pattern for the MPLP with a constraint programming model in the second phase. The computational results indicate that this algorithm can solve difficult instances to the optimality within reasonable computational times.

Inventory Rationing in a Capacitated System with Backorders and Lost sales

Ying Tang¹, Dongsheng Xu², Weihua Zhou³
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²Sun Yat-Sen University, China
³Zhejiang University, China

In this paper, we study a periodic review, capacitated, make-to-stock system with two demand classes. The first class demand comes from customers who have long term and profitable relationships with the manufacturer. The second class demand comes from the retail market. The first class demand not satisfied immediately is backordered, whereas the unsatisfied second class demand is lost. There are two fundamental decisions for managing such a system, i.e., production decision and rationing decision. We prove that a base stock rationing policy is optimal. Furthermore, through an extensive numerical study, we study the cost savings of the optimal policy compared with two common used heuristics and show that the benefit of the optimal control policy can be quite significant.

A Hybrid Search Heuristic for Supply Chain Planning with a Multi-Level Multi-Item Capacitated Lot Sizing Model

Hyun Joon Shin¹
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Planning distributed manufacturing logistics is one of the main issues in supply chain management. This paper proposes a hybrid heuristic approach for the Multi-Level, multi-item Capacitated Lot Sizing Problem (MLCLSP) in supply chain network. MLCLSP corresponds to a mixed integer programming (MIP) problem. With integer variable solutions determined by heuristic search, this MIP problem becomes linear program (LP). By repeatedly solving the relaxed MIP problems with a heuristic search method in a hybrid manner, this proposed approach allocates finite manufacturing resources for each distributed facilities and generates feasible production plans. Two heuristic search algorithms, tabu search and simulated annealing are presented to solve the MIP problems. The experimental test evaluates the computational performance under a variety of problem scenarios.

A Two-commodity Deteriorating Inventory Model with Price-dependent Demand

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Recently, inventory models considering deteriorating items have attracted much more attention in that almost all commodities in real life deteriorate over time. This study deals with a two-commodity deteriorating inventory model when the demand of each commodity depends linearly on the selling prices of both two commodities. Deterioration rate of each commodity is assumed to be time-proportional and the time to deterioration follows a two-parameter Weibull distribution. The objective of this study is to find the joint optimal pricing strategies and replenishment policies to maximize the total average net profit in a replenishment cycle. This problem can be finally formulated as a nonlinear programming and the optimal solution is proved to be exist. Solution procedure and algorithm of searching for the optimal solution are given in detail. A numerical example is given at last which illustrates the results of the model. The optimal solutions and some useful curves are obtained by simulating with Matlab 7.0.

Multi-Location Inventory System with Lateral Transshipments and Emergency Orders

Siradej Charniyom¹, Moon-Kyu Lee², Lee Luong¹, Romeo Marian¹
¹University of South Australia, Australia
²Keimyung University, South Korea

Inventory redistribution and emergency replenishment in supply chains have long been studied in various contexts. From our strategic perspective, both systems can be used alternatively to cope with product shortages in a supply chain, especially for situations where high shortage costs are involved. In this paper, we present an incorporated scheme of Lateral Transshipments and Emergency Orders in a Multi-Location Inventory system. We focused on a complex distribution network consisting of a capacitated distribution center and multiple retailers. A mathematical model is formulated in order to determine optimal inventory policies of the integrated systems. Lastly, we proposed a solution methodology using a hybrid Genetic Algorithm to solve the integrated multi-location inventory problem.

A Combined Spatial Cluster Analysis - Traveling Salesman problem Approach in Location-routing problem: A Case Study in Iran

Mohammad Saeed Zaeri¹, Jamal Shahrabi², Mahmood Pariazar², Arash Morabbi³
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²Amirkabir University of Technology, Iran
³Islamic Azad University, Iran

We have attempted to model and to solve a version of the newspaper distribution problem. A key element in the analysis is the interplay between the distribution operation and the production operation. The newspaper production/distribution problem, NDP, is an example of a perishable-good production and distribution problem. In this article, we propose a methodology that by using cluster analysis and Traveling Salesman problem try to allocate facilities to demand points and route them in each cluster.

Session	F (15:30 - 17:30)
Topic	Supply Chain Management (6)
Date	Tuesday - December 4, 2007
Room	Mercury I
Chairs	Sarada Prasad Sarmah and Arun Kumar

Logistics Flows Coordination in Supply Chains Using Enterprise Input-Output Models

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The coordination of logistics activities have a particular importance where production activities are both remarkably diffused or concentrated. In the paper, we propose the use of an enterprise input-output model to analyse logistics flows in order to support coordination policy, ranging from hierarchy to market, at the level of the whole supply chain. Finally, a case study related to an Italian company producing leather upholstery is considered and different coordination policies are compared in terms of logistics performance.

A Fuzzy Aggregate Production Planning Model for Make-to-Stock Environments

Reza Tavakkoli-Moghaddam¹, Masoud Rabbani¹, Amir Hossein Gharehgozli¹, Nima Zaeerpour¹

¹University of Tehran, Iran

This paper presents an aggregate production planning model for make-to-stock (MTS) environments. Since multiple sources of imprecision and complex inter-relationships at various levels between diverse entities exist in the supply chain (SC), we can use stochastic or fuzzy control models to describe the complex SC processes, associated management, and control tasks. We consider the fuzzy sets theory as a solution to tackle the uncertainties in different terms of the model. Finally, the effectiveness of the proposed model is demonstrated by a numerical example.

A Bi-level Programming Model for Supplier Selection in Constructing Logistics Service Supply Chain

Mei Guo¹, JinFu Zhu¹, XiuLi Zhao¹

¹Nanjing University of Aeronautics & Astronautics, China

In order to reduce the subcontract cost and improve service quality gradually in constructing logistics service supply chain, a bi-level programming model to describe the game relationship between integrated logistics service supplier and subcontract supplier is put forward, its upper-level objective function is to determine subcontract total cost which should be minimized, its lower-level objective function is subcontract supplier's total service quality which should be maximized. A criterion on measuring subcontract supplier's service quality was presented as "synthetically expressive degree(SED)". Then true influencing factors and their weights were gained by reducing all influencing factors based on fuzzy-rough set. According to true influencing factors' weights, we can calculate synthetically expressive degree of each subcontract supplier. A genetic algorithm to solve model was proposed, a rule of dealing with constraints and lower-level objective function were designed and applied to the genetic algorithm. Finally, a simple simulation application was illustrated; the result indicates the method is good at inspiring subcontract supplier to cut down price and improved service quality at the same time.

Genetic based approach for the Multi Product Multi Period Inventory Routing Problem

Nur Arina Bazilah Aziz¹, Noor Hasnah Moin¹

¹University of Malaya, Malaysia

The Inventory Routing Problems (IRP) is an important component of Supply Chain Management. The IRP refers to the coordination of the inventory management and transportation. The solution in IRP gives the optimum vehicle routing while at the same time minimize the transportation and inventory costs. The problem addressed is of the many-to-one type with finite horizon, multi-periods, multi-suppliers, single assembly plant and a part-supply network where a fleet of capacitated identical vehicles, housed at a depot, transport parts from the suppliers to meet the demand specified by the assembly plant for each period. We propose a hybrid genetic algorithm based on allocation first, route second method to determine an optimal inventory and transportation policy that minimizes the total cost. We introduce two new representations and design corresponding crossover and mutation operators. It is found that a simple representation produces very encouraging results.

Theory of Inventive Problem Solving (TRIZ) Applied in Supply Chain Management of Petrochemical Projects

Reza Movarrei¹, Sara Vessal¹

¹Project Management R&D Center, Iran

An innovative Supply Chain Management system is a vital core competency for competitiveness of any company in today's dynamic markets. Such an SCM system has to integrate ongoing innovations into its processes and welcome future ones. This paper studies issues relate to documentation and classifications of innovations and generally have an experimental origin. First, SCM Innovations applied by Petrochemical Industries Development Management Company (PIDMCo.) in last seven years have been extracted. PIDMCo is a national Iranian company which acts as a project based organization and manages procurement and operation of a large portfolio of petrochemical plant projects.

40 inventive principles (classes) of TRIZ -one of the less widely used innovation tools- have been the basis of the study for documentation and classification of innovations in procurement and supply chain management of the company. Classification (assigning innovations into 40 classes and development of analogies) has been performed by expert judgment based on analysis for re-applicability. Resulting framework based on 40 innovative principles then has been mapped against elements of company's procurement and SCM system to check applicability and validity of innovative patterns. Results show a good potential for speeding up innovation in SCM with use of TRIZ systematic approach. In the last section some difficulties of TRIZ application in SCM are discussed.

A Case Study for Synchronized Scheduling of manufacturing and air transportation in Consumer Electronics Supply Chain

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²Nanyang Technological University, Singapore

This paper concerns on the case of the supply chain of an electronics manufacturer. The manufacturer encountered problems in daily operations. The problem is formulated as a synchronized scheduling of air transportation and parallel machine scheduling problem. A synchronized scheduling method is proposed to solve the problem. Using the real data from the company, the results show that the synchronized scheduling method is superior to current operations method.

Improving the Performance of Manufacturer-distributor Partnerships Through Knowledge Transfer – a Knowledge-based Perspective

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¹University of Oulu, Finland

This paper illustrates how the performance of manufacturer-distributor partnerships can be improved from a knowledge-based perspective in the Chinese context. The multiple case study shows that two flows of knowledge contribute to the performance of partnerships through improving the joint activities of the partners. The flow of knowledge from manufacturers to distributors is product-oriented. This flow of knowledge supports the distributors' understanding of the products and motivates their initiative in marketing activities. The flow of knowledge from distributors to manufacturers is market- and customer-oriented. This flow of knowledge supports the product improvement of the manufacturers and facilitates the collaboration between two partners. The main obstacles of the knowledge transfer are cultural differences. Trust and open communication are two facilitators in the process of knowledge transfer.

A Control Chart Design for Supplier in View of Quality, Due Time and Cost

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This paper presents a design of the Xbar control chart in view of quality, due time and cost to improve customer satisfaction of supplier. Recently, due to ever increasing competition in supplier markets, it is demanded to offer the low-cost and high quality product in short due time. Therefore, studying the balance of quality and the due time and cost has become a new problem to supplier. In short run process, the time of treating an assignable cause (ACT time) is an important effect to the total cost and due time. To resolve the above problem, in this research, first a design of the Xbar control chart is developed in which the ACT time was considered. Then, from an economic viewpoint, the mathematical formulations which correspond to the design are shown. Finally, by numerically consideration, the balance of quality (control limits width) and due time and the total expectation cost is discussed, and the new relations between the due time, ACT time and the total expectation cost are found.

Session	D (11:00 - 12:30)
Topic	Operations Research and Application (4)
Date	Tuesday - December 4, 2007
Room	Mercury II
Chairs	Deniz Aksent and Farnaz Barzinpour

Currency Arbitrage Detection Using A Binary Integer Programming Model

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We introduce a binary integer programming model to detect arbitrage opportunities in currency exchanges. A network simplex method has been introduced to solve the model efficiently. Moreover, through sensitivity analysis, the solution to our model can be updated quickly to detect new arbitrage opportunities when the exchange rates change in real-time.

Teaching and Playback Control System for Parallel Robot for Ankle Joint Rehabilitation

Jianguang Sun¹, Jinyong Gao¹, Jianhui Zhang¹, Runhua Tan¹

¹Hebei University of Technology, China

The designed and experimental process of the teaching and playback control system of parallel robot for ankle joint rehabilitation is narrated. Teaching-box was fulfilled with single chip MCU system. The teaching and playback progress was executed as three modes, including point by point mode, continuous mode and mixed mode. During the teaching and playback progress, the max torque of the motor could be changed. With the control of three torque motor, the playback of parallel robot for ankle joint rehabilitation could be realized.

Data Construction Method for Basis Selection in RBF Networks

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¹National Tsing Hua University, Taiwan

Feedforward neural networks have demonstrated an ability to learn arbitrary nonlinear mappings. Knowledge of such mappings can be of use in the identification and control of unknown or nonlinear systems. One such network, the Gaussian radial basis function (RBF) network has received a great deal of attention recently. In RBF networks, however, the problems of determination of the appropriate number of Gaussian basis functions and existence of the overlapped basis functions remain two critical issues. In order to overcome the mentioned problems, a systematic procedure, namely Data Construction Method (DCM), was proposed in this paper. A numerical example of function approximation was provided for illustration and validation. The obtained results show that DCM is a useful technique to improve the learning performance of RBF networks.

Analogies between Flexible Job Shop Scheduling and Vehicle Routing Problem

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Different similarities and analogies have been investigated between the Travel Salesman problem (TSP) and the one machine sequencing problem, and common heuristics and bounds were also established for the two problems. Recently, works focalised on possible analogies between variants of vehicle routing problems (VRP) and parallel machine scheduling problems.

In this paper, we present different analogies between two complex combinatorial optimization problems: the VRP and the Flexible Job Shop Scheduling Problem (FJSSP) and use it for the calculation of new VRP lower bounds.

Solving Capacitated P-Median Problem (CPMP) using Genetic Algorithm

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Capacitated p-median problem (CPMP) is an important variation of facility location problem in which p capacitated medians are economically selected to serve a set of demand vertices so that the total assigned demand to each of the candidate medians must not exceed its capacity. This paper presents a genetic algorithm to solve the CPMP. Two different assignment techniques namely, classical assignment method and assignment through urgencies are used to assign the demand points to the p selected medians. The behavior and efficiency of the assignment scenarios are examined and compared on CPMP. According to the results, the classical scenario shows superiority in time consuming, whereas the assignment through urgencies scenario is absolutely superior in quality of the obtained solutions over the classical one. In order to check for quality and validity of the suggestive method, we compare the final solution produced over the 10 test problems of Osman and Christofides [1]. Comparison of the results indicates good quality and solutions.

Chaos Theory and Application in Sells Management

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Progresses in calculation tools in recent decades have provided us with the possibility of utilizing theories based on existence of certain or chaotic non-linear patterns. Chaotic theory with more through study of specifications of complicated behavior and data that seem to be random, try to recognize order and pattern governing them and use them for predictability future trend in short term. Nowadays this knowledge with the help of data behavior analysis has provided the base of structural changes in future performance prediction.

In this article, probability of chaos in daily sales volume in an industrial unit with regard to test of strange attractor and biggest Lyapunov exponent has been investigated. Result of applying the method discloses existence of some degree of certainty in these data.

Session	E (13:30 - 15:00)
Topic	Operations Research and Application (5)
Date	Tuesday - December 4, 2007
Room	Mercury II
Chairs	Jih-An Chen and Joaquin Sicilia-Rodriguez

Stochastics in Discrete Logistics Models: What Can We Do?

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A large number of logistics problems involve integer programming. Adding stochastics to such a problem seems computationally prohibitive. On the other hand, in most cases, stochastics is an integral part of the underlying problem. And more importantly, without adding stochastics explicitly, we may lose important aspects of the solution we are searching for. In this presentation we give a new approach to such problems, and apply the approach to service network design.

A General Method to Apply Dantzig-Wolfe Decomposition for Variational Inequalities with Affine Constraints

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We develop a general method by which we can apply Dantzig-Wolfe (DW) decomposition method to any variational inequalities (VI) with affine constraints. By adding dummy variables for creating linking constraints, the VI problem can be decomposed into a master equilibrium problem and a NLP subproblem. That is, the subproblem can be solved by any sophisticated NLP solvers. By making use of the Karush-Kuhn-Tucker (KKT) conditions of the decomposed problems in Dantzig-Wolfe decomposition, we can show that simplicial decomposition for any VI would be equivalent to DW on the "dummy variable" version of VI. Consequently, both SD and DW might benefit by the insights of the other. An illustrative example of applying both methods to asymmetric traffic assignment problems is provided.

A 2opt-DPX Genetic Local Search for Solving Symmetric Traveling Salesman Problem

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The combination of genetic algorithm and local search is a promising approach that attempts to benefit the advantageous of both approaches in solving the traveling salesman problem. In this paper we present a 2opt-DPX Genetic Local Search Algorithm for solving symmetric TSP instances. The main idea of this approach is to use a local search heuristic to create population of local optimum solutions and then applying genetic algorithm to find global optimum in the population of local optima. We describe its performance on some standard symmetric TSP instances and finally put forward some suggestions to improve its capability and efficiency.

Vertical Decomposition Approach To Solve Single Stage Capacitated Warehouse Location Problems

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In this paper Vertical Decomposition Approach is used for the first time to solve Single Stage Capacitated Warehouse Location Problems (SSCWLP). Stages of Warehouse location problems are decomposed to get smaller sized problems, which are relatively easier to solve. New formulation of SSCWLP are developed using the style of [9]; and worked out by applying vertical decomposition approach. Relaxation of flow balance constraints leads to two different versions of Capacitated Plant Location Problem (CPLP), referred to as RHS_CPLP and LHS_CPLP. It is found that RHS_CPLP is exactly identical to CPLP [13]; but LHS_CPLP is different from RHS_CPLP. Reference [13] gives 13 relaxations of CPLP (which is found identical to RHS_CPLP for this paper). We extend these relaxations for the problem LHS_CPLP also. 13 different relaxations of SSCWLP (with the proofs comparing their strengths) are developed. We found that the strong relaxation of SSCWLP given in [10], is same as relaxation R3_O given in this paper. Also, there are other relaxations of SSCWLP that are better than strong relaxation proposed in [10].

An Application of Tabu Search Algorithm on Cost-based Job Shop Problem with Multiple Objectives

Zhecheng Zhu¹, Kien Ming Ng¹, Hoon Liong Ong¹

¹National University of Singapore, Singapore

A cost-based job shop problem with multiple objectives (MOCB-JSP) is proposed in this paper. Three different objectives are considered in the objective function of MOCB-JSP: work in progress (WIP) holding cost, earliness cost and tardiness cost. Tabu search algorithm is applied to improve the initial schedules of MOCB-JSP. Extensive experiments are conducted to test the performance of the tabu search when different parameter combinations are taken. Computational results show that tabu search with a properly configured parameter combination significantly improves the schedule quality with reasonable computational effort.

Session	F (15:30 - 17:30)
Topic	Operations Research and Application (6)
Date	Tuesday - December 4, 2007
Room	Mercury II
Chairs	Adam Ng and Pen-Yuan Liao

Fuzzy Linear Regression Models with Absolute Errors and Optimum Uncertainty

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Various kinds of the fuzzy regression models are introduced in the literature and many different algorithms are proposed to estimate fuzzy parameters of the models. In this study a new approach is introduced to find the parameters of a linear fuzzy regression, the input data of which is measured by crisp numbers. A new objective function is designed and solved, by which a minimum degree of acceptable uncertainty (the h-level or h-cut) is found. Two numerical examples are presented to compare the proposed approach with other methods.

Modelling Corporate Financial Crisis Management: Optimal Cashflow Management in SMEs

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The application of optimisation models and techniques to corporate financial crisis management is not very common, even though there are numerous theoretical and empirical models that have been applied in relation to financial optimisation theory and practice, and cashflow management techniques. This research develops a cashflow optimisation technique for SMEs in an abrupt financial crisis resulting from natural or man-made disasters such as fire, flood, storm, etc. The development and application of such a dynamic model is particularly important due to the frequency and severity of natural and man-made disasters in the various economic sectors of Australian small business communities. The implications of the model's results for financial crisis management are discussed.

Product Development Performance Measures in Manufacturing Firm

Zhonghang Bai¹, Peng Zhang¹, Fang Liu¹, Runhua Tan¹

¹Hebei University of Technology, China

Product development is becoming more and more importance for manufacturing firm. However, a well-designed performance measurement system can demonstrate the impacts of product development on the whole firm and be utilized for motivation of people, especially product development staff. At the same time, suitable product development measures provide valuable information for the controlling of activities and continuous improvement of the product development process. This paper reviews the evolution of manufacturing sectors, analyzes the role of performance measures and product development performance measure proposals in manufacturing, especially from the standpoint of manufacturing firms in China.

Dynamic Preventive Maintenance Policy Based on Health Index

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The purpose of this article is to propose a dynamic preventive maintenance policy for the repairable deteriorating system. Assume that the system after repair can not be "as good as new", and general repair which brings nonstationary recovery is adopted. We propose the health index (HI) which can be inspected by equipment to describe the status of the system, and suppose that general repair has the corresponding recovery ability for different health index. Then, a discrete Markov decision process (MDP) for the maintenance policy optimization under minimizing the long-term average cost rate is built. Finally, a real case study from Chen and Feldman (1997) is presented to verify that the abovementioned methodology is efficient and practical.

Development of A New Model for the Flowshop Problem

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A new mixed integer linear programming model for the regular flowshop scheduling problem is proposed in this paper. We show how the model is derived from an existing model mathematically. The new model has less number of constraints than the old model, whereas it has more number of variables. In an experimental design, the new model solves a class of problems in significantly less computational time than the existing model.

A Hybrid Optimization Methods for Nonlinear Programming

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Nonlinear programming models often arise in science and engineering. A nonlinear programming model consists of the optimization of a function subject to constraints, in which both the function and constraints may be nonlinear. This paper proposes the hybrid NM-PSO algorithm, which is based on Nelder-Mead (NM) simplex search method and particle swarm optimization (PSO), for solving nonlinear programming models. NM-PSO is easy to implement in practice as it does not require gradient computation and has been successfully applied in such unconstrained optimization problems as data clustering and image segmentation. Based on the results of solving six test functions taken from the literature, it is shown that the hybrid NM-PSO approach outperforms particle swarm optimization in terms of solution quality and convergence rate. The new algorithm proves to be extremely effective and efficient at locating optimal solutions.

Realtime Dynamic Multilevel Optimization for Demand-Side Load Management

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¹G-SCOP, France

This paper focuses on Demand-Side load Management applied to residential sector. A multi-scale optimization mechanism for demand-side Load management is proposed. It compose the Agent Management of Energy, it carries out the distribution of the energy of the housing by proposing a dynamical threshold of total energy consumption will be applied to each household. The home automation system integrated in each household plays the role of controlling all the energy consumption in the housing by using service flexibilities, which have the possibilities to be modified and controlled. Thanks to the feedback of the satisfaction of the client by the home automation system, the Agent Management can modify the limit of power consumption of the household again. This mechanism of control takes dynamically into account the comfort of the users and satisfies the constraint from the energy production capabilities. A simulation of 200 housing is also illustrated the performance of this control mechanism.

Manufacturing Parts Sourcing with Delayed Transportation Policy

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¹Koc University, Turkey

We propose a joint inventory and transportation policy for a manufacturer that needs to source multiple parts from a single supplier over a multi-period planning horizon in order to facilitate its production plan. Instead of shipping trucks from the supplier to the manufacturer immediately whenever an order is given in a period, we allow delaying transportation to the next period in order to decrease the number of truck shipments with low truck loads. At the same time we maintain a minimum safety stock of each part at the manufacturer so that the production plan is not disrupted. We introduce a mixed integer programming model that represents the interdependency between ordering and transportation decisions and minimizes the sum of both transportation and inventory holding costs incurred to the manufacturer under the proposed policy. This model is utilized to improve the parts sourcing operations of a bus manufacturer in Istanbul with estimated sizeable savings on total costs.

Session	D (11:00 - 12:30)
Topic	Decision Analysis and Methods (4)
Date	Tuesday - December 4, 2007
Room	Mercury III
Chairs	Xiansheng Qin and Chengter Ho

Environmental Practices for Manufacturing Performance: FANP Approaches

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Environmental practices in manufacturing performance receive increasing scrutiny from researchers and practitioners because of the great uncertainty involved in the study. This research integrates the effort of management, engineering and social science and investigates the integrated environmental practice framework in order to reach a level of certainty in manufacturing performance. The proposed research method preliminary identifies and structures the strategic and operational elements into a framework that helps management in evaluating alternatives under uncertainty. The result indicates that delivery is the most important alternative in lower uncertainty whereas lower cost in higher uncertainty.

Prioritization of Competitive Priority in Cleaner Production Implementation

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The aim of this paper is to identify the cleaner production implementation manufacturing firm to prioritize competitive priority in environmental uncertainty. Fuzzy analytic hierarchy process, the research methodology, discusses to tackle the different decision criteria involved in the prioritization of the alternatives in the case firm. It is an efficient tool to handle the fuzziness of the data involved in deciding the preferences of different criteria in order to select the alternatives. Each comparison is tapped in the form of triangular fuzzy numbers to construct fuzzy pairwise comparison matrices. The proposed model, from literatures, can provide a framework for the organization to prioritize the competitive priority in cleaner production implementation. The research finding is the PCB manufacturer prioritized flexibility as major competitive priority in environmental uncertainty.

Evaluation of Worker Productivity Improvement Using ISM and FAHP

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In recent years, many printed circuit board manufacturing firms have looked upon worker productivity improvement as the means by which they could improve their firm performance. This paper uses the critical factors and interpretive structural modeling that determine the structure of analytical hierarchical process model in fuzzy environment. Fuzzy analytic hierarchy process based methodology be discussed to tackle the different decision criteria in a hierarchical structure in the improvement of worker productivity. The findings advocate that these manufacturing firms would thereby the hierarchical model to setup the priorities of the worker productivity improvement. And best practice, reduce unit cost and physical working environment are the crucial sub-factors for worker productivity improvement.

New Product Portfolio Selection Using Fuzzy Logic

Ching-Torng Lin¹

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Limited by the resources a company requires to strategically allocating resources in a set of new product projects. A portfolio management decision is usually made on the basis of product value, project risk and business strategies. Due to both the nature and timing of new product development, portfolio selection is associated with uncertainty and complexity, and conventional evaluation methods not can handle such decisions suitably and effectively. However, fuzzy logic is well suited for decision making with uncertainty. Thus, a method for portfolio selection decision using fuzzy logic is proposed. As an illustration, an IT new product portfolio selection in Taiwan's company is cited to demonstrate the evaluation procedure can be used in new product portfolio.

Applying Incomplete Linguistic Preference Relations to a Selection of ERP System Suppliers

Tien-Chin Wang¹, Yu-Chen Chiang¹, Shu-Chen Hsu¹

¹I-Shou University, Taiwan

This study provides a method to solve the Incomplete Linguistic Preference Relations under Multi-Criteria Decision Making. The method uses simple calculation and can speed up the process of comparison and selection of alternative. Decision-making Experts obtain the matrix by choosing a finite and fixed set of alternatives and set a pairwise comparison based on their different preferences and knowledge. The method considers only $n-1$ judgments, whereas the traditional analytic hierarchy approach takes $n(n-1)/2$ judgments in a preference matrix with elements. By using the method described above, this study evaluates the ERP system suppliers.

A Fuzzy TOPSIS Approach with Entropy Measure for Decision-Making Problem

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Multiple criteria decision-making (MCDM) is widely used in ranking one or more alternatives from a set of available alternatives with respect to multiple criteria. Inspired by MCDM which are methods to systematically evaluate alternatives, we propose a new fuzzy TOPSIS approach for evaluating alternatives using both subjective and objective weights. Objective weight can be helpful in identifying more important attributes. With our method, we provide decision makers more information to make more subtle decisions.

Session	E (13:30 - 15:00)
Topic	Decision Analysis and Methods (5)
Date	Tuesday - December 4, 2007
Room	Mercury III
Chairs	Jerzy Michnik and Shurong Tong

On Decision Criteria for One-Shot Decision with Possibilistic Information

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In this paper, approaches for one-shot decision problems with partially known information characterized by possibility distributions are proposed. The procedure for one-shot decision consists of two steps. The first step is to identify which state of nature should be considered for each alternative. Eight kinds of criteria are introduced for choosing the states of nature called focus points. The second step is to evaluate alternatives based on the focus points. Using the proposed one-shot decision approach, a newsvendor problem with possibilistic information is analyzed.

The Fuzzy-Entropy Approach for Techno-economic Analysis of The Green Construction Energy-saving Structure System

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²National University of Singapore, Singapore

Multistoreyed civil buildings usually adopt brick-concrete or reinforced concrete (RC) frame structure. However, both of these structures have obvious defects. Green structure is a new kind of construction energy-saving structure system. By applying information entropy theory and fuzzy math method, this paper proposed the techno-economic compare and comprehensive evaluation about the three structures above-mentioned, and illustrated the notable techno-economic and society environmental benefits which are brought by the application of Green structure system. The research provided the solid academic foundation for the popularization and application of this kind of energy-saving structure system.

An Effective Heuristic Algorithm based on Segmentation for Solving a Multilevel Lot-sizing Problem

Ikou Kaku¹, Zhaoshi Li¹, Chunhui Xu²

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²Chiba Institute of Technology, Japan

This paper presents an effective heuristic algorithm for solving the multilevel lot-sizing problem, which is an important decision making process in manufacturing production systems and a well-known benchmark of combinatorial optimization problems. The heuristic algorithm is based on the soft optimization approach, which has been reported recently that it can seek a good enough solution with a high probability for solving the multilevel lot-sizing problem. However, there were several points should be improved in the solution performances obtained by the soft optimization. One of them is how to construct the samples because even using the same uniform sampling method there may some different algorithms be and can lead to different sample. In this paper we discuss the sample construct problem and develop a heuristic algorithm based on segmentation. The effectiveness of the heuristic algorithm is presented by comparative experiments with the soft optimization and the genetic algorithm.

Using AHP in Decision Analysis - the Case of Vietnam State Securities Commission

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This paper uses Saaty's Analytical Hierarchy Process (AHP) to formulate the strategy framework for Vietnam's State Securities Commission (SSC). In the first step, a questionnaire was designed to find Key Success Factors (KSFs) of the strategy of Taiwan Financial Supervisory Commission (FSC) by using the benchmarking technique. Criteria for questionnaire are carefully selected based on the Principles for securities market regulation set forth by the International Organization of Securities Commissions (IOSCO). The KSFs of FSC were then used to conduct a survey in the State Securities Commission of Vietnam (SSC). The data collected by AHP-structured pair wise comparisons were constructed into a computer-based program called Expert Choice. The result shows that top priority choice for SSC is to build up financial and operational capacity for securities firms, which in turn, will best support other alternatives. Another finding shows useful techniques in strategic management widely applicable in the business world can perfectly fit into the not-for-profit contexts in a way that it can help SSC reassessing and remodeling current flows of work in developing the nascent securities market to be the market that protect investors, insure fair, effective, transparent environment and reduce market systemic risk.

Fuzzy AHP in Prioritizing Feeders for Maintenance in Nuclear Power Plants

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¹Indian Institute of Technology Bombay, India

A fuzzy version of prioritizing among a number of alternatives under different decision criteria of Saaty's pair wise comparison method is presented in this paper. Each ratio expressing the relative significance of a pair of factors is displayed in a matrix from which suitable weights can be extracted. Since these ratios are essentially fuzzy -they express the opinion of a decision-maker on the importance of a pair of factors. This method is used in such a way, that experts are asked to express their opinions in fuzzy numbers with triangular membership functions. The method is applied at two levels: beginning with finding fuzzy weights for the decision criteria, and followed by finding fuzzy weights for the alternatives under each of the decision criteria. Fuzzy scores for the alternatives are obtained. Using the fuzzy scores, experts will be able to prioritize the alternatives for maintenance activities based on the listed criterion. The method is illustrated for outlet feeders in a nuclear power plant with representative values.

Session	F (15:30 - 17:30)
Topic	Production Planning and Control (1)
Date	Tuesday - December 4, 2007
Room	Mercury III
Chairs	Kim Leng Poh and Kuang-Yao Wu

Semiconductor Production Planning Using Robust Optimization

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We consider a semiconductor chip production planning problem, where chips with different performance characteristics are produced from the same wafer supply simultaneously. Due to long production cycle times, decisions on the wafer production need to be executed prior to knowing the demands and binning information exactly. Once this information is realized, assignment decisions are then executed to allocate the available production to satisfy the demands. Furthermore, product substitution is allowed in the allocation. To address the issue of data uncertainty in the planning process, in this work we propose to use the robust optimization approach to develop a new planning model for the problem. Our model is based on a two-stage robust network flow problem, and we demonstrate that by using our proposed model, we are able to achieve production plans that can hedge against the random variations in the data without over-sacrificing the solution quality. Furthermore, the robust optimization models require limited distributional assumptions and result in linear programming counterpart problems, which can be solved efficiently using commercial solvers.

TOC/DBR Based Production Planning and Control in a Manufacturing System with Multiple System Bottlenecks

Zailin Guan¹, Yunfang Peng¹, Xiaoling Yang¹, Xinyu Shao¹

¹Huazhong University of Science & Technology, China

Bottleneck limits the throughput of a system, and multiple bottlenecks make the system harder to plan and control. In this paper, we propose a TOC/DBR based method for production planning and control when multiple bottlenecks exist. Especially, an algorithm for bottleneck scheduling with setup time is presented, and some simulation study has been carried out in an electronics manufacturing enterprise to validate its effect.

Market-based Negotiation Model for Employ-driven Distributed Production Scheduling

Moonsoo Shin¹, Jungtae Mun¹, Mooyoung Jung¹

¹POSTECH, South Korea

The up-to-date market dynamics and decentralization have brought about the needs for agile production control and distributed decision making. Thus, an efficient and effective approach to coordination of distributed and dynamic decision entities is required. In this paper, a dynamic production control framework for distributed production systems is addressed by adopting a market-based negotiation approach, which is a promising approach compatible with the requirement. In the framework, production control is regarded as a continuous procedure of making employment contracts between production resources. In particular, a negotiation model for dynamic distributed scheduling is presented, including the internal decision models of principal entities, employer and employee.

Decentralized Planning and Control for Assembly Areas Driven by Gentelligent® Parts

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Logistically controlling assembly areas is based on processing information. The availability of the required information is thus a decisive factor. This paper introduces an approach for controlling assembly areas. The method is based on processing information from so called Gentelligent® parts. Gentelligent® parts can function as storage mediums and as such are able to record, save, process and communicate information. Due to these properties, Gentelligent® parts can function as a decentralized Enterprise Information System (EIS). As a result, extensive potential for improving logistic and technical processes arises along the product evolutionary process and during the usage phase.

Analytical and Heuristic Approaches for Solving the Spatial Scheduling Problem

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Spatial scheduling seeks optimal allocation of space apart from an efficient temporal schedule. Applications are common in shipbuilding industry and at places where space is a resource. Previous approaches to solve the problem focus on use of computational geometry and genetic algorithm. In this paper with the help of some realistic assumptions we formulate the problem as a special case of three dimensional bin packing problem. We show that for block shop scheduling problems time window and precedence constraints may provide efficient bounds for solving the problem optimally. For areas where these bounds are not available we suggest a heuristics approach to arrive at good spatial schedules.

A Bayesian Network Approach to Job-Shop Rescheduling

Nur Aini Masruroh¹, Kim Leng Poh¹

¹National University of Singapore, Singapore

Recently most researches in the scheduling area focus on scheduling under uncertainty, as real-world production activities are subject to considerable uncertainty. In highly dynamic situation, it is often required to resolve the baseline schedule. Deciding the right time to change the schedule becomes critical in minimizing the additional cost involved. The need for method that enables updating of current information and situation is absolutely required. In this paper we proposed a methodology to manage the shopfloor uncertainty using Bayesian Network (BN). Although BN is widely used in several domains, the use of BN in manufacturing area is still uncommon. BN is a powerful approach for reasoning under uncertainty and it can be used to model the real time shop-floor condition. Here, we consider the schedule as a part of the total system. Hence, the proposed model considers both direct and indirect factors, i.e. it includes the interaction of the schedule with other factors in the system. Furthermore, BN is extended into Influence Diagram to evaluate the need of rescheduling. In addition, a different approach is proposed to define the conditional probability of the nodes that need further analysis. The proposed method is applied to the case of stochastic job-shop scheduling systems.

Process Disturbance Identification Using ICA-Based Image Reconstruction Scheme With Neural Network

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²National Taipei University of Technology, Taiwan

³Virginia Polytechnic Institute & State University, United States

⁴Ching Yun University, Taiwan

Process monitoring and control of a production line are often used in industry to maintain high-quality production and to facilitate high levels of efficiency in the process. However, current process control techniques, such as statistical process control (SPC) and engineering process control (EPC), may not effectively detect abnormalities, especially when autocorrelation is present in the process. This paper proposes an independent component analysis (ICA)-based image reconstruction scheme with a neural network approach to identify disturbances and recognize shifts in the correlated process parameters. The resulting image can effectively remove the textual pattern and preserve disturbances distinctly. We illustrate our approach using two most commonly encountered disturbances, the step-change disturbance and the linear disturbance, in a manufacturing process. The experimental results reveal that the proposed method is effective and efficient for disturbance identification in correlated process parameters when disturbance is significant. Additionally, the identification rate made by the proposed method is slightly influenced by the data correlation.

An Empirical Investigation of Learning Curve Laws in the Tile Manufacturing Industry

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¹Democritus University of Thrace, Greece

The ceramic tile manufacturing industry is under constant strain today due to the competitive environment worldwide and to the changing patterns of consumer behavior. Despite its highly automated production lines, the industry is becoming less of a mass manufacturer and more of a batch producer with all the corresponding issues that such a move entails. The frequent setup and re-tooling of the production has led to renewed interest on the subject of learning curve laws and their impact on the productivity of items re-introduced after short periods of time to the product mix. The actual industrial data presented in this paper support the premise that the learning curve phenomenon is present, albeit in a more complex sense, when tile patterns are produced in relatively small batches and the resulting ramp-up is reminiscent of new product setup.

Session	D (11:00 - 12:30)
Topic	Systems Modeling and Simulation (1)
Date	Tuesday - December 4, 2007
Room	Jupiter I
Chairs	Jayendran Venkateswaran and Kiekgang Chao

Design Management for Project Success

Leon Pretorius¹, Arie Wessels², Alex C Rooney²

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²Denel Dynamics, South Africa

This paper briefly reviews design management with the aim of re-emphasizing its relationship to systems and Systems Engineering as well as Project Management. The important role that design management can play in project success is illustrated in two South African case studies.

Service-Oriented Architecture on a Windows Cluster for Spreadsheet Simulation

Juta Pichitlamken¹, Puthong Uthayopas¹, Supasit Kajkamhaeng¹, Noocharin Tippyawannakorn¹

¹Kasetsart University, Thailand

We present a proof-of-concept prototype for applying service-oriented architecture (SOA) on a Windows cluster to spreadsheet simulation. A scalable architecture based on Web Services is proposed. The experimental results show that the prototype system functions in a highly scalable way.

Integrated Performance Measurement to Support Strategic Decision Making in Engineering Organisations

John Davis¹, Alasdair MacDonald¹, Emad Marashi²

¹University of Bristol, United Kingdom

²Power & Water University of Technology, Iran

This paper highlights the growing importance of integrated performance measurement in the management of engineering organisations. The authors present a systematic, process-based method to help strategic decision makers use organisational performance information. The method uses a common language to present both qualitative and quantitative evidence taken from past and current data and from forward looking scenarios and simulations. Different applications of the method from highways engineering and the electricity supply industry are presented in order to highlight its functional flexibility.

A Vehicle-Target Simulation Model for Network-Centric Joint Air Operations

Madjid Tavana¹, Nathaniel Gemelli², Robert Wright²

¹La Salle University, United States

²Air Force Research Laboratory, United States

Joint Air Operations (JAO) are traditionally orchestrated using static vehicle roles assigned from command and control. The central command and control model used by the Air Force cannot anticipate changes in the battlespace and take advantage of continuous information provided by the sensors in a network-centric environment. With recent advances in information and communication technology and the increased need for a dynamic and flexible response, vehicles are expected to assume multiple roles over the course of a mission. In this study, we develop a simulation model that considers four competing objectives (effort, effectiveness, efficiency, and connectivity) to assess vehicle-target allocation for network-centric JAO.

Stranded on Emergency Isle: Modeling Competition for Cardiac Services using Survival Analysis

Scott Levin¹, Jin Han¹, Dominik Aronsky¹, Chuan Zhou¹, Nathan Hoot¹, Lori Kelly¹, Dan France¹

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Patients with cardiovascular disease (CVD) consume a large proportion of inpatient, procedural and emergency services within United States health care system. These patients are major contributors to the steadily increasing demand for health care services nationwide. Unfortunately, economic and legislative factors have resulted in concurrent reductions in hospital system capacity. The resulting imbalance has fallen directly on to the shoulders of emergency departments (ED) in the form of boarding. Boarding refers to the act of holding admitted patients in the ED until an inpatient bed becomes available. Boarding is a barrier to efficient throughput, a major contributor to ED overcrowding and a threat to patient safety. Patients with CVD often use the ED as an entry point to the hospital system. These patients frequently experience long boarding times as a result of hospital wide competition for inpatient resources.

The objective of this study is to use survival analysis to determine how demand from competing cardiology admission sources affects access to ED patients requiring inpatient cardiac care. The model reflects bed management policies of the division of cardiology and demonstrates how variability in demand for cardiac services (i.e., surgical, catheterization, telemetry, intensive care) affects ED boarding time for cardiac patients.

Session	E (13:30 - 15:00)
Topic	Systems Modeling and Simulation (2)
Date	Tuesday - December 4, 2007
Room	Jupiter I
Chairs	Leon Pretorius and Yiping Lu

A Business Process Simulation Environment based on Workflow and Multi-Agent

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Simulation is an effective way to evaluate the performance of the business process model and it provides supports to process reengineering. But current business process simulation cannot model the complex factors and is lack of a distributed and extendable system framework. An integrated business process simulation environment based on workflow and multi-Agent is provided in this paper. In the environment, persons are modeled as agents, which can have individual complex properties and behaviors. At the same time, the enforcement of complex task assignment policies is simulated through a bidding process among agents. The system structure, key technologies together with the implementation are presented in the paper.

A Multi-Stage Modeling Framework for Web Service Composition

Jian Xiao¹, Li Zheng¹

¹Tsinghua University, China

This paper considers Web service as a process net and defines it as an extended Petri net, in order to inherit the closure property of Petri nets. Some operators in the web service calculus are illustrated and mapped to the Petri nets operation. Then a multi-stage modeling framework for Web service composition is proposed based on formal modeling language. The framework is semi-automatic. It leverages the advantages of process algebra and semantic web modeling approaches, and integrates various practical tools proposed by literatures in each stage to improve productivity and reduce the expert skill requirements.

Modeling Reconfigurable Information Systems by using an Executable Algebraic Framework

Yi Huang¹, Benjamin Koo¹, Li Zheng¹

¹Tsinghua University, China

The new generation information systems demand higher quality integration of applied physical aspect and corresponding information aspect. Reconfigurability is addressed as a key property to meet the challenges of the rapidly changing physical context. Actually, the modern information systems such as Reconfigurable Manufacturing Systems (RMS) and Business Process Management (BPM) systems demand a high degree of reconfigurability, which requires systems that are built on properties of modularity, flexibility and scalability. We argue that algebraic languages are particularly suitable as a system analytical framework for constructing and implementing a modular, flexible and scalable information system. This paper presents an algebraic framework called Algebra of Systems (AoS) and the associated supporting modeling tool called Object-Process Networks (OPN). The framework suggests an integration of actions and interactions between the referred physical and information aspects through a process-driven viewpoint, in order to automate and speed up information system reconfigurability analyzing and modeling phases.

Language Integration for Model Validation

Thouraya Bouabana-Tebibel¹

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System validation allows to check whether the modeled system complies with the customer requirements. For UML modeling, these requirements can be specified as invariants using the Object Constraint Language OCL. OCL is an extension of the UML notation for the expression of restrictions over the diagrams. To validate OCL invariants, we develop an approach based on Petri nets and temporal logics. This approach allows the non trivial integration of the temporal logic properties translated from the OCL invariants with the Petri nets obtained from the UML 2.0 activity partitions. A case study is given throughout the paper to illustrate the approach.

An Optimizing Applied Algorithm for Complicated non-Markov Queuing Systems via Simulation (A Case Study)

Mohamad Mahdavi¹, Mojtaba Mahdavi¹

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Most of the real queuing systems include special properties and constraints, which can not be analyzed directly by using the results of solved classical queuing models. Lack of Markovian chains features, unexponential patterns and service constraints, are the mentioned conditions. This paper represents an applied general algorithm for analysis and optimizing the queuing systems. The algorithm stages are described through a real case study. It is consisted of an almost completed non-Markovian system with limited number of customers and capacities as well as lots of common exception of real queuing networks. Simulation is used for optimizing this system. So introduced stages over the following article include primary modeling, determining queuing system kinds, index defining, statistical analysis and goodness of fit test, validation of model and optimizing methods of system with simulation.

Translating Graphical Conceptual model from STATEMATE to FNLOG

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In this paper, We propose an approach based on automatic derivation schemes from STATEMATE models to FNLOG specifications. STATEMATE is a semi formal method that pertains to the specification and design of complex reactive systems and builds simulations and prototypes rapidly. Though STATEMATE provides rigorous specifications, these are not verifiable to ensure and guarantee the reliability of the system being developed. To fulfill this objective, a STATEMATE specification is translated into a logicbased specification language called FNLOG which allows its verification. This paper describes the translation approach, cross references between STATEMATE and FNLOG features, and the translation algorithm.

Session	F (15:30 - 17:30)
Topic	Systems Modeling and Simulation (3)
Date	Tuesday - December 4, 2007
Room	Jupiter I
Chairs	Jian Cao and Maode Ma

A Conceptual Design Model Using Axiomatic Design, Functional Basis and TRIZ

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Axiomatic design can provide efficient tools and logical analyzing processes to obtain good design. However, axiomatic design has its limitations. For example, function-structure model has not been standardized yet and also there is no method found, which can solve the design problem. In this paper, we propose to integrate functional basis and TRIZ as enabling technologies to be employed in axiomatic design. First, we introduce functional basis as the uniform expression for modeling to maximally reduce the diversities of the function-structure model obtained by using Zigzagging mapping. Second, we integrate functional basis and key words in contradiction, evolution and effect in TRIZ as the theoretical basis for problem solving in design.

Designing Reusable Building Blocks of Simulation Models for FMS with Multi-Sections

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²National Chiao Tung University, Taiwan
³National Taiwan University of Science & Technology, Taiwan

Flexible Manufacturing System (FMS) is an automated manufacturing system that incorporates all the relatively individual processing stations (CNC machines) within the production plant. FMS is fundamental of reducing cost, rising reliability and coordination of flexibility, and productivity. This paper considers the simulation study in the efficiency of multi-sections FMS to perform the various types for several part operations in terms of maximize throughput, WIP and waiting time with alternative routes selection by synthesizing dispatching rules. The study will also focus on the reused modules building functionality. Modeling efforts can be reduced to a great extent through the development of domain specific modules that encapsulate the domain-specific logic and hide many of the modeling details. The key feature of this conception is to allow user to define new modeling modules that can be tailored to a specific problem domain.

A Job Shop Scheduling Approach Based on Simulation Optimization

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With regards to the problem of the traditional scheduling approach can't establish the precise scheduling models and obtain the satisfied scheduling results at the same time, a new scheduling approach based on simulation optimization methodology is presented. The approach comprises two modules: genetic algorithm (GA) based optimizer and discrete event simulation model. Candidate scheduling schemes represented by a serial of scheduling rules are suggest by GA that automatically guides the system towards better solutions. Simulation models are used to evaluate the performance of candidate scheduling schemes, the results of evaluation are returned to the GA to be utilized in selection of the next generation of candidate scheduling schemes to be evaluated. This process continues until a satisfactory solution is obtained. In addition, In order to build simulation model rapidly for the similar production conditions, a simulation modeling approach based on modular control models including shop level controller model, cell level controller model and equipment level controller model is present. The approach encompasses control logic, which are separated from the basic modeling elements in the simulation model, of different levels in production system. Finally, a case study is presented to illustrate the application of the proposed approach.

On the Max-Plus Linear Representation for Event-Varying Systems with Buffer and Order Constraints

Hiroyuki Goto¹, Keisuke Shoji¹, Hiromasa Nagai¹, Masaru Onuma¹
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This paper extends the existent state-space representation based on max-plus algebra and proposes a new form that can take into account both capacity and order constraints. It is often essential to consider these factors when applying the MPL (Max-Plus Linear) approach to scheduling problems for production or transportation systems. The derived form is a type of augmented state-representation and can contribute to obtaining the earliest start and completion times for processes in installed facilities.

An Overview of Application of System Dynamics Modeling For Analysis of Indian Sugar Industry

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Sugar cane and sugar sectors are quite important segments of the Indian agriculture sector with great potential for impacting rural development. Sugar industry has proved itself to be a nucleus of rural development, particularly in its surrounding areas and has carved for itself a very significant role in the national economy. The performance of Indian sugar industry depends on national and international factors which include sugar price, consumption pattern, Government policies or support programme to name a few. The paper discusses the present national and international scenario of sugar industry and their impact on the performance. SD is an approach, which takes a causal view of reality, and uses quantitative means to investigate the dynamic behavior of socio-technical systems and their response to policy. This paper presents a conceptual framework for application of System Dynamics modeling for analysis of Indian sugar industry. It also describes how System Dynamics (SD) can aid as an effective management tool to resolve the complex dynamic issues of sugar industry management.

Improving Performance of a Station and Smoothing the Exit Rate in an Assembly Line

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Assembly line is the most well-known mass production system which was first used by Henry Ford in automobile industries. Malfunction of a station will have an impact on the whole assembly line. Having a great impact on the performance of the whole assembly line, interaction of the stations on each other should be considered precisely. In this paper we will use discrete event simulation to improve performance of a station and the whole assembly line by smoothing the exit rate, which is the entrance rate to the next station. At the end of this article, the results for a case problem are illustrated and several conclusions are driven.

Advanced Look-ahead Based Approach (ALBA) for Distributed Simulation of Supply Chains

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Distributed simulation is an emerging technique for simulation of supply chains consisting of multiple independent detailed discrete-event models. Time synchronization is one of the critical issues that affect the accuracy of results, network load and execution time. An Advanced Look-ahead Based Approach (ALBA), a hybrid conservative approach for time synchronization, is proposed that allows the models to run as-fast-as-possible to the nearest interaction event. This is achieved using an improved supply chain domain specific look-ahead algorithm that handles multiple types of interactions. The effect of stochasticity of the models on the performance of the look-ahead algorithm is discussed. Also, the performance of ALBA is appraised against two other hybrid time synchronization approaches in literature. Experimental results using a four player distributed supply chain simulation show that ALBA functions better than the other approaches in terms of network communication load and execution time.

Abrasive Process Machine Simulation Model, a Discrete and Continuous Approach

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Abrasive machining is commonly defined as a process to remove material by the action of sharp grain of abrasive mineral in order to obtain a final desired shape and surface quality. Therefore is considered one of the most important processes in the wood industry. The use of simulation on the most critical process in the wood industry would definitely help to have a better understanding of the processes and the effect of changes such as equipments, operators, and raw material, as well as others. The objective of this research is to simulate the abrasive process machine in wood machining to have a better understanding of the variables behavior that significantly affect sanding process when change in time. The model is using a large amount of equations (650+). The model integrates continuous and discrete simulation, in addition, it can be interactive (the operator learning curve can be introduced into the model), and includes stochastic considerations in operation time, maintenance, repairs, etc

Session	D (11:00 - 12:30)
Topic	Quality and Reliability Engineering (1)
Date	Tuesday - December 4, 2007
Room	Jupiter II
Chairs	Rong Pan and Chih Wang

Reliability-Directed Distributed Computer-Aided Design System

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A theoretical approach and applied techniques for designing analogous electronic devices and systems with due account of random variations in system parameters and reliability specifications are considered. The paper discusses the problem of choosing parameter nominals of electronic devices and systems for which the system survival probability or the performance assurance probability for the predetermined time period is maximized. Several algorithms for region of acceptability location, modeling and discrete optimization using parallel and distributed processing are discussed. For seeking a numerical solution of the parametric design problem a distributed computer-aided reliability-oriented design system is proposed.

A Study on Software Reliability Prediction Based on Support Vector Machines

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Support vector machines (SVMs) have been successfully used in many domains, while their application in software reliability prediction is still quite rare. A few SVM-based software reliability prediction models have been proposed in the literature; however, the accuracy of prediction can still be improved. In this paper, we propose an SVM-based model for software reliability prediction and we study issues that affect the prediction accuracy. These issues include: 1. Whether all historical failure data should be used; 2. What type of failure data is more appropriate to use in terms of prediction accuracy. We also compare the prediction accuracy of software reliability prediction models based on SVM and artificial neural network (ANN). Experimental results show that our proposed SVM-based software reliability prediction model could achieve a higher prediction accuracy compared with ANN-based and existing SVM-based models.

Software Release Optimization for a Non-Kalman Filter SRGM

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The optimality of the One-Bug-Look-Ahead (OLA) software release policy proposed in [1] for a non-Kalman filter type of Software Reliability Growth Model (SRGM) is disproved in [2]. The remaining question -- what is the optimal policy -- is answered in this paper. It turns out that the optimal policy has a control-limit structure similar to OLA, but is not as impatient. A key step in the research is the identification of a Markov structure implied in the Bayesian updating mechanism which in turn reduces the optimal stopping formulation to an easily solvable Markov decision problem. A numerical example based on the NTDS data is included for illustration.

Prediction of System Reliability for Multiple Component Repairs

Yong Sun¹, Lin Ma¹, Joseph Mathew¹

¹Queensland University of Technology, Australia

Optimal asset management in industries requires accurate reliability prediction of complex repairable systems. A Split System Approach (SSA) has previously been reported for predicting the reliability of complex systems with multiple Preventive Maintenance (PM) cycles in a long term horizon. However, the existing formulae were derived with an assumption that always the same single component is repaired in all PM actions. This paper extends the model to the scenario where different single component is repaired. The model can be used to determine the remaining life of the system and to show the changes in reliability with PM actions for this scenario, and hence can be used to support asset PM decision making over the whole operation and maintenance stage of the asset, such as scheduled PM times. Assets often have a number of vulnerable components, i.e., the lives of these components are much shorter than the lives of the rest of the system. An optimal time of sequential PM actions on these critical components can maximise the useful life of the asset effectively. The model developed in this paper can be used to determine this optimal PM strategy.

The Effect of Dependency on the MRL Function of Redundant Systems

Ali Zeinal Hamadani¹, Azam Nasri¹

¹Isfahan University of Technology, Iran

In some circumstances active or standby redundancy is used to improve the reliability of the system while in others, series redundancy is used to improve a different utility measure of the system. In assessing the reliability of a system with redundant components it is often used to suppose the independency of the components, this assumption is rarely valid in practice. In this paper the effect of adding redundancy on the mean residual life time function of the system is studied when two components are dependent and have a bivariate FGM distribution and the results are compared with the case of two independent.

A Weighted Loss Function Approach to the Multivariate RPD Problem

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As products/processes often possess several quality characteristics, Robust Parameter Design (RPD) problem is likely to be dealt with by considering multiple responses. Several researches have solved this problem by using loss function. A weighted loss function approach built on these researches is proposed in this paper to make a good trade-off between bias and variation components of the objective function. In addition, an algorithm of the weight parameter is also suggested, which can be used when the prior information is vague. An example from the literature is given to illustrate the proposed method, and a numerical comparative analysis of the results from different articles is also provided.

Session	E (13:30 - 15:00)
Topic	Quality and Reliability Engineering (2)
Date	Tuesday - December 4, 2007
Room	Jupiter II
Chairs	Bo Yang and Vinod Puranik

Bayesian Evaluation Approach for Process Capability Based on Subsamples

Huiming Zhu¹, Jun Yang¹, Liya Hao¹
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Process capability indices (PCIs) have been widely used to measure the actual process information with respect to the manufacturing specifications, and become the common language for process quality between the customer and the supplier. Most of existing research works for capability testing are based on the traditional frequentist point of view and statistical properties of the estimated PCIs are derived based on the assumption of one single sample. In this paper, we consider the problem of estimating and testing process capability using Bayesian statistical techniques based on subsamples collected over time from an in-control process. The posterior probability and the credible interval for the most popular index C_p under a non-informative prior are derived. The manufacturers can use the presented approach to perform capability testing and determine whether their processes are capable of reproducing product items satisfying customers' stringent quality requirements when a production control plan is implemented for monitoring process stability.

Process Targeting of Multi-characteristic Product using Fuzzy Logic and Genetic Algorithm with an Interval Based Taguchi Cost Function

Syed Mujahid¹, Salih Duffuaa¹
¹King Fahd University of Petroleum & Minerals, Saudi Arabia

In this paper, a fuzzy based process targeting model is developed for a product with multi-characteristic. It is assumed that the desired quality characteristics cannot be measured directly and has to be calculated indirectly from multi-input process parameters. A fuzzy relation between observed/input parameters and required/output characteristics is proposed. A genetic algorithm is developed to obtain optimal process targets. The utility of the proposed model and algorithm is illustrated by a realistic example.

Integration of Taguchi's Loss Function in the Economic Design of (\bar{x}) -Control Charts with Increasing Failure Rate and Early Replacement

Anas Al-Ghazi¹, Khaled Al-Shareef¹, Salih Duffuaa¹
¹King Fahd University of Petroleum & Minerals, Saudi Arabia

In this paper, Taguchi's quadratic loss function is incorporated in the economic design of the control chart. This is done by redefining the in-control and out-of-control costs using Taguchi's loss function in the general model for the economic design of \bar{x} -control charts developed by Banerjee and Rahim [1]. Both cases of increasing hazard rate (Weibull failure rate) and constant hazard rate (exponential distribution) will be presented and followed by numerical examples. Finally, sensitivity analysis is conducted to study the effect of important parameters on the cost. Suggestions for further research are also included.

System Performance, Degradation, and Reliability Assessment

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Degradation test and analysis provide the information to reliability assessment of a system. Online degradation monitoring can be adopted for real-time system performance reliability or survival prediction. This paper discusses the concepts of system performance, degradation, and system performance reliability assessment. The off-line degradation data analysis for estimating of time-to-failure distributions with asymptotic variances, and the on-line performance degradation for reliability assessment and prediction with time series are reviewed and discussed. The off-line method is useful to the estimate of time-to-failure distributions to those components with extremely high reliability, whereas the on-line method can be applied to those systems, in which degradation may result in a sudden catastrophic system failure. The statistical methods in the two situations are discussed.

Faults Diagnosis Based on System Model in a Discrete-part Machining System

Shichang Du¹, Lifeng Xi¹
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Root cause identification is one of deciding factors in current manufacturing competitions. For a discrete-part machining system, it is very challenging to identify the faults, since the final product variation caused by faults is an accumulation from all stations. This paper explores a faults diagnosis methodology for the root causes identification of a serial machining system. Firstly, a system model is described to capture the relationship between process faults and product quality. Then based on the model, the Maximum Likelihood Estimation algorithms are built to estimate the key parameters of measurement data, such as the mean value and variance, which followed by a hypothesis testing method to determine the root causes at certain confidence level. A real machining case illustrates the effectiveness of the proposed faults diagnosis methodology.

Quality Issues in Enameling of Ceramic Industry Products

Ioannis Georgilas¹, Vassilios Tourassis¹
¹Democritus University of Thrace, Greece

This paper details a set of quality issues associated with the enamelling of ceramic industry products. Enamelling is a common manufacturing process in the sanitary ware industry, where enamel is applied on the ceramic substrate to provide a coating of protection against corrosion and bacterial infection. This mass manufacturing process combines manual and robotic manipulation and presents unique quality issues. The issues identified in this paper are representative of a greater family of coating processes that deal with complex surfaces and pose special challenges for production and quality engineering departments.

Session	F (15:30 - 17:30)
Topic	Quality and Reliability Engineering (3)
Date	Tuesday - December 4, 2007
Room	Jupiter II
Chairs	Xiaoyue Jiang and Salih Duffuaa

CUSUM Quality Control Chart for Monitoring Energy Use Performance

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This paper builds on measuring and evaluating energy use performance of a process using statistical process control charts. This paper discusses the application of the latest SPC tool named CUMulative SUM of difference (CUSUM) to monitor energy use data so that abnormal changes can be detected in a timely manner. The application case study to highlight the benefits of CUSUM charts for monitoring energy use performance is presented and performance of these charts is compared to the traditional control chart.

D-Optimal Reliability Test Design for Two-Stress Accelerated Life Tests

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Multiple-stress accelerated life tests (ALTs) are often employed for reliability testing of electronic parts. It is important to derive the optimal designs for these tests. However, most of the existing literature on experimental design of ALTs discusses only single-stress tests. In this paper we formulate the D-optimal design for two-stress ALTs with log-normal failure time distribution. It is shown that an efficient testing plan can be obtained with required estimation precision. ALT experimental designs for both completed failure time data and time censored data are discussed.

VSSI X-Bar Control Charts for Processes With Multiple Assignable Causes

Ho-Joong Lee¹, Tae-Jin Lim², Seung-Cheol Jang¹

¹Korea Atomic Energy Research Institute, South Korea

²Soongsil University, South Korea

This research investigates the statistical efficiency of variable sample size and sampling interval (VSSI) X-bar control charts under multiple assignable causes. Algorithms for calculating the average run length (ARL) and average time to signal (ATS) of a VSSI X-bar control chart are proposed by employing the Markov chain method. States of a process are defined in vector forms according to the location of a control statistic and the occurrence states of the assignable causes. Initial probabilities and transition probabilities are carefully derived from the definitions of the states. Statistical properties of the proposed control chart are also investigated. Illustrative examples show that the VSSI X-bar control chart is superior to the VSS or VSI X-bar control chart as well as to the Shewhart X-bar control chart in a statistical sense, even under multiple assignable causes.

A Neural Network Ensemble for Classifying Source(s) in Multivariate Manufacturing Processes

Jian-Bo Yu¹, Lifeng Xi¹

¹Shanghai Jiao Tong University, China

In multivariate statistical process control, most multivariate quality control charts are shown to be effective in detecting out-of-control signals based upon an overall statistics. But these charts do not relieve the need for pinpointing the source(s) of the out-of-control signals. Neural Networks (NNs) have excellent noise tolerance and high pattern identification capability, which have been used successfully in MSPC. This study proposed a selective ANNs ensemble approach DPSOEN, where several ANNs selected are jointly used to classify source(s) of out-of-control signals in multivariate processes. Extensive experiment is also carried out to examine effects of six statistical features on the performance of

DPSOEN. The investigation proposes a heuristic approach for applying DPSOEN as an effective tool to identify abnormal source(s) in bivariate SPC with potential application for MSPC in general.

Speeding-up Experiences Return During New Productions Industrialization

Samuel Bassetto¹, Aymen Mili¹, Ali Siadat²

¹INPG, France

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For semiconductors industries, mastering each new technology ramp-up is a key component of success on this grueling marketplace. This article presents the use and the deployment of operational risk concept to master the industrialization phase. Paper's propositions focus on experience feedback and operational risks during this critical period which can compromise a plant's future.

A Study of Genetic Algorithm for Project Selection for Analogy Based Software Cost Estimation

Yanfu Li¹, Min Xie¹, Thong Ngee Goh¹

¹National University of Singapore, Singapore

Software cost estimation is critical for software project management. Many approaches have been proposed to estimate the cost with current project by referring to the data collected from past projects. Analogy Based Estimation (ABE), which is essentially a case-based reasoning (CBR) approach, is one of such techniques. In order to obtain successful results from ABE, many previous studies developed effective methods to optimize the weights of the features (Feature Weighting). However, ABE is criticized for the low prediction accuracy, and the sensitivity to the outliers. To alleviate these drawbacks, we introduce the selection of appropriate project subsets (Project Selection) by Genetic Algorithm. The promising results of the proposed method and the comparisons against other ABE model and machine learning techniques indicate our method's effectiveness and potential as a candidate method for Software Cost Estimation.

Research on Optimization Model of Multi IT Applications based on Nonlinear Goal Programming Method

Hongxun Jiang¹, Yongyan Yang¹, Ming Dong¹

¹Renmin University of China, China

IT service performance tuning aims to meliorate the resource allocation for multi IT applications hierarchized by business logic, grounded on the cooperative enterprise intranet environment which is distributed and heterogeneous, in order to get the best business support levels and gain maximum profit with resources constraints. After analyzing the two factors that have impact on the application service, the authors emphasize in this paper the establishment of performance tuning model which optimizes the resources allocating policy, based on goal programming method. And then an example is given to validate the availability of the model. Finally further issues about the existing problems and future improvement about the model are discussed.

Reliability Analysis of a Two Unit System

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¹University of Nizwa, Oman

²Caledonian (University) College of Engineering, Oman

The aim of the paper is to present a reliability analysis principles and modeling techniques to technological systems. The paper thus proposes a two unit cold standby system with the concept of rest period of the repairman. A system with a single repairman is analyzed, where repairman is given rest when tires during the job and the system waits till his recovery. Some important reliability indices are obtained by using semi-Markov processes and regenerative point techniques. Expected total profit incurred to the system is also obtained. Mean times to system failure and profit results are demonstrated graphically for hypothetical values.

Session	D (11:00 - 12:30)
Topic	Manufacturing Systems (1)
Date	Tuesday - December 4, 2007
Room	Jupiter III
Chairs	Sittichai Kaewkuekool and Jian-Bo Yu

Optimization of Cellular Manufacturing Systems Design Using the Hybrid Approach based on the Ant Colony and Tabu Search Techniques

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¹Ecole de technologie supérieure/University of Québec, Canada

Cellular Systems Design Problems (CSDP) constitute an important issue in the design of Cellular Manufacturing Systems (CMS). A few years back, it emerged as the best alternative in manufacturing systems, representing a compromise between the efficiency of serial and the flexibility of batch production systems. In this paper, we propose a hybrid approach for solving the CSDP for large industrial data sets. This procedure comprises an Ant Colony Optimization (ACO) and the Tabu Search (TS) procedure, which is added in order to improve the quality of the ACO solutions obtained. The problem is formulated as a binary integer programming model that might minimize the dissimilarities existing between machines or parts, and that is characterized as an NP-complete model. With this proposed approach, the results obtained show that it is efficient in terms of the quality and computational time of the solutions. To demonstrate the potential ability of the proposed approach, a numerical example has been investigated.

Cell Formation with Workload Data in Cellular Manufacturing System Using Genetic Algorithm.

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²Kalasalingam University, India

³National Institute of Technology, India

Cellular Manufacturing System (CMS) is regarded as an efficient production strategy for batch type of production. CMS rests on the principle of grouping the machines into machine cells and parts into part families based on suitable similarity criteria. Usually zero-one machine-part incidence matrix (MPIM) obtained from the route sheet information is used to form machine cells. In this paper, an attempt has been made to solve the cell formation problem considering work load data and a genetic algorithm (GA) is suggested to form machine cells and part families. The performance of the proposed algorithm is compared with existing algorithms such as K-means algorithm and modified ART1 algorithm found in the literature using a newly defined performance measure known as modified grouping efficiency (MGE). The proposed algorithm is tested with problems from open literature and the results are compared with the existing algorithms found in the literature. The results support the better performance of the proposed algorithm.

Web-enabled Calibration of Micro Robotic System

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¹Ajou University, South Korea

²The University of Texas at El Paso, United States

³Drexel University, United States

The remote calibration of robot has not been feasible due to technical limitations. Recently, the advances in Internet technologies enabled various production equipment, sensors, and control functions integrated with network systems. The purpose of this study is to demonstrate the feasibility regarding the remote calibration of web-controllable production micro robotic system. Many technical merits can be accrued from this approach. Robot operators do not have to be on-site, and the positioning accuracy of the robot can be quantified and verified. The geographical barriers can be overcome and the robot can be integrated into the automated information networks for more efficient production planning and guaranteed part positioning accuracy.

The Component based Remote Management System for the FA Machine via the Internet

Hwa-Young Jeong¹, Jeoung Woo Byun¹, Young Jae Song¹

¹Kyunghee University, South Korea

These instructions give you basic guidelines for preparing camera-ready papers for AP's journals. The component logic makes up the remote status view of the GUI communication modules which has associating the message interrupt method and the timer. This research aimed the IC test handler and this system can display on the web for review and analysis. The proposed method improves the analyzability by catching the operational data under various operation statuses.

Study of the Industrial Influential Factors of Capital Allocation Efficiency in China's Manufacturing Industry

Liwei Cheng¹, Jin-chan Ren¹

¹Harbin Institute of Technology, China

This paper calculates the yearly capital allocation efficiency of twenty eight manufacturing industries in China from 1999 to 2005 and analyzes influential factors of capital allocation efficiency with panel data model and sectional data model. Econometrical results show that the influential factors include FDI, foreign capital's monopoly degree on high-tech and capital-intensive industries, labor population's reflecting coefficient on industrial growth and capital return rate. The higher ratio of foreign fixed equity is, the higher allocation efficiency is; the higher foreign capital's monopoly degree in high tech and capital-intensive industries is, the lower allocation efficiency is; the higher labor population's reflecting coefficient on industrial growth is, the higher capital allocation efficiency is; the higher capital return rate is, the lower allocation efficiency is. Accordingly, when making the most use of foreign capital's allocation effect its monopoly on high-tech and capital-intensive industries should be avoided. Meanwhile the government should distribute investing scale, total credit quota and information of supply and demand in the market to make the enterprises and financial structure know economic condition of now and future to avoid negative influence that over affect manufacturing industry's capital allocation efficiency when industrial structure upgrades.

A Genetic Algorithm for Layout problems in Cellular Manufacturing Systems

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The layout problem is one of important decision in cellular manufacturing systems (CMS). After deciding the cells and the intercellular movements in the cell formation stage, it is necessary to do proper layout of machines to get effective utilization of CMS. Proper layout will minimize material handling cost to a greater extent. In this paper, a mathematical formulation is presented. As it is NP-hard, a genetic algorithm is adopted as solution methodology. In order to validate the performance of the algorithm a well known quadratic assignment problems (QAP) that deals with location are taken for testing which shows that the proposed methodology provides promising results. The effectiveness of GA approach is evaluated with numerical examples. The cost performance is compared with other approaches. The intra cell layout problem is discussed.

Session	E (13:30 - 15:00)
Topic	Manufacturing Systems (2)
Date	Tuesday - December 4, 2007
Room	Jupiter III
Chairs	Reza Tavakkoli-Moghaddam and Ponnambalam Sivalinga G

Complex Scheduling Strategy for Dynamic Environment in Digitalization-Production Shop

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The digitalization-production shop is a very complex and dynamic production environment. It a task-oriented production organization, so its production scale and machining ability should be dynamic too. This paper presents a two-hierarchical strategy to analyze the machine load balance and machinability so as to obtain a feasible schedule with minimum total tardiness and maximum machines utilizations.

In the first hierarchy, using fuzzy judgment, the substitution of equipment or combination of equipment can be found, which has similar functions with the bottleneck equipment. The tasks in the bottleneck equipment can be dispatched to the substitutable equipment in order to achieve load balance. The second hierarchy is an optimization part. A new scheduling algorithm, which integrates genetic algorithm and particle swarm optimization algorithm, is adapted to solve scheduling problem. It is more effective than genetic algorithm. The validity and feasibility of the strategy is verified by the final experiment.

Considering a Cyclic Multiple-Part Type Three-Machine Robotic Cell Problem

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²Tarbiat Modares University, Iran

In this paper, we develop a new mathematical model for a cyclic multiple-part type three-machine robotic cell problem with assumption of S₆ robot movement policy that minimizes the cycle time. The developed model is based on Petri nets and provides a new method to calculate cycle times by considering waiting times. It was proved that calculating cycle time under S₆ policy is unary NP-complete. Obtaining an optimal solution for this type of complex, large-sized problem in reasonable computational time by using traditional approaches and optimization tools is extremely difficult. In this paper we implemet the particle swarm optimization (PSO) algorithm for solving the problem. To validate the developed model and solution algorithm, various test problems are examined.

An Investigation on the Multiple Attribute Decision Making (MADM) Methods for Solving the Cell Formation Problem

Arshia Ahi¹, Behzad Ashtiani¹, M.Bahador Aryanezhad¹, Ahmad Makui¹
¹Iran University of Science & Technology, Iran

This paper deals with the cell formation problem that is the first step in designing cellular manufacturing system (CMS). The previous methods that were based on the array-based clustering for solving the cell formation problem have used the part-machine incidence matrix (PMIM) which was indicated the set of machines for processing each part. The main problem of these methods is the grouping parts and machines regardless of production volume, operational sequences, production cost, inventory and other production system's limitations. In this paper we intend to implement the multiple attribute decision making (MADM) concepts for covering the cause of drawback in the previous array-based clustering methods by considering two definitions of the arrays in PMIM. Four methods are presented that two methods are related to the binary arrays in PMIM and other two methods are considered the operational time as well as the operational sequencing in the definition of the arrays in PMIM. The results of the presented methods that are compared with a well-known approach are also reported.

A Novel Collaborative Control Strategy for Collaborative Manufacturing

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²Ningbo City College of Vocational Technology, China

The paper propounds a complete system architecture including task planning, configuration management and collaborative control for collaborative manufacturing. Collaborative control is vital in the collaborative manufacturing for controlling the communications and production management between alliance-host and out-manufacturers staff. A collaborative control strategy adopted through the whole procedure of collaborative manufacturing will be introduced to collaborative manufacturing, which solves the problem of disorder of collaborative manufacturing as a result of frequent modification of product requirements and plan of task.

Multi-agent Based Reconfigurable Manufacturing Execution System

Min Yu¹, Weimin Zhang¹, Peter Klemm²
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²Universität Stuttgart, Germany

Fierce market competition forces enterprises and manufacturing systems to organize the manufacturing resources dynamically to react to perturbations of market quickly. As the bridge between shop floor level and control level, Manufacturing Execution System (MES) should be flexible, adaptable, reusable and extendable. To meet these requirements, a two-fold hybrid multi-agent control architecture, which takes advantages of distributed and decentralized control architecture, and the functions of each agent are introduced. In this paper reconfigurable MES (RMES) is realized by a synergy of two concepts: reconfigurable manufacturing cell and blackboard architecture. RMC possesses some characteristics and functions of RMC to enable manufacturing resources to be reconfigured dynamically. As the core agent of the RMES, configuration agent utilizes the blackboard architecture which has several attractive features such as explicit control, modularity, and structured interaction. To implement the framework, the reconfiguring process of RMES is established.

Surface Profile Tolerance Measuring Method using Kriging Method

Jongseong Kim¹, Hoogon Choi¹
¹Sungkyunkwan University, South Korea

The measuring time required to inspect a machined part using a coordinate measuring machine (CMM), especially for a given form or profile tolerance, should be minimized and this can be achieved by reducing the number of sample points obtained from a machined surface. In this paper, variogram and kriging models, both well-known, are evaluated in terms of the degrees of prediction accuracy given in an NURBS surface and machined surface. The Gaussian variogram model and ordinary kriging model are utilized to predict the machined surface profiles. For faster inspection, the number of sample data is reduced by using a modified median filtering based on both models. Finally, both maximum and minimum points on a machined surface are searched in order to inspect a given tolerance range by using the geometric similarity and a sphere. The research results presented here will be valuable in enabling the use of a 3-axis CMM rather than the more expensive 5-axis CMM.

Session	F (15:30 - 17:30)
Topic	Manufacturing Systems (3)
Date	Tuesday - December 4, 2007
Room	Jupiter III
Chairs	Isa Nakhai Kamalabadi and Huitian Lu

A Study of Influent Factors in Surface Quality of Hard Turning

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This object of this research was to study factors influencing on surface quality of hard turning by comparing the surface quality of cutting work. Material used in the experiment was a hardened main shaft SCM4, which had hardness form 52 to 56 HRC. The experiment was run by factorial design, which consisted of feed rates, depth of cut and cutting speed. The cutting tools were CBN – tipped cutting inserts and conventional machine was used. Results revealed that an influential factor was feed rate, which was significantly influent to surface quality at the level of 0.05. Low feed rate could cause less roughness, but higher feed rate could cause greater roughness. The relationship between feed rate and depth of cut was not affected to surface quality. Predicted roughness of surface by regression equation was showed the relationship between feed rates and roughness of surface on hard turning work.

The Manufacturing Strategy Formation Process Case Study of Six Iranian Manufacturing Companies

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¹NRISP, Iran

²Young Researchers Club, Iran

This paper describes case study research undertaken in six Iranian manufacturing companies aimed at advancing the understanding of the manufacturing strategy formation process. Based on this study culture, leadership, policy and incrementalism have their own undeniable roles in manufacturing strategy formation. It could be useful to utilize formal business planning for firms interested in deliberative manufacturing strategy. In this study we use Barnes's studies on six UK manufacturing companies.

Design of Changeable Assembly Systems – A Complexity Theory Based Approach

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Since most of today's industrial products are characterized by high complexity and numerous customer-specific variants, adaptive production system concepts are needed to meet the quickly changing market and customer requirements. At the same time, these production systems have to be highly competitive in terms of cost per unit. Most research activities have been concentrated on manufacturing system design so far. However, in assembly system design there is still a need for methodological support. This paper introduces a methodology that helps to systematically identify and reduce complexity in assembly systems and to redesign them according to the objectives of high changeability and efficiency.

A Competitive Framework for the South African Clothing Industry

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¹University of Johannesburg, South Africa

The SA clothing industry has shed over 67 000 jobs in the past three years (Terry Bell, Star 15 September 2006). There is a possibility that more jobs may be shed in the South African clothing industry over the next few years (Bell, 2006). The SA clothing industry is facing a great challenge because of the rapidly changing business environment with respect to global competition, market performance, and advancing technology. The study is part of doctoral thesis and has focused on the development of a framework that would assist to reaffirm and re-establish strategies that may improve the current plight of manufacturers and help prevent job losses through innovative thinking (www.dti.org.za).

The methodology adopted in the research includes a review of existing literature and documents on the industry from Clofed, Texfed, relevant research reports from the DTI, NEPAD, newspaper articles, journal articles such as the International Journal of Clothing Science and Technology and Operations Management, interviews and discussions with organizational staff and management (Blaxter, L et al. 2006).

Design of a Government-Subsidized Collection System for Incentive-Dependent Returns

Ayşe Gonul Tanugur¹, Deniz Aksent², Necati Aras¹

¹Bogazici University, Turkey

²Koc University, Turkey

We address the problem of locating collection centers for a company that aims to collect used products (cores) in order to capture their remaining value by recovery operations. A pick-up strategy is in place according to which vehicles are dispatched from collection centers to the locations of product holders to transport their returns. Each product holder has an inherent willingness to return a core, and decides on the basis of the quality-dependent financial incentive offered by the company. Since the company seeks only economic profitability, the collected amounts may not be aligned with the target collection ratio imposed by the government. In this case, the government may alleviate the under-collection issue through a subsidy paid to the company for each core collected. From the government's perspective the problem is to find the minimum subsidy level while meeting the target collection ratio. We propose a bilevel programming formulation for this collection system design problem. Since the problem is NP-hard, a heuristic method is developed to solve medium and large size instances. This approach explicitly focuses on the relationship between government authorities and profit-oriented companies, and yields a frontier between the concurrent objectives of collection ratio satisfaction and subsidy minimization.

Solving Permutation Flow Shop Sequencing using Ant Colony Optimization

Fardin Ahmadizar¹, Farnaz Barzinpour¹, Jamal Arkat¹

¹Iran University of Science & Technology, Iran

This paper proposes an ant colony algorithm for permutation flow shop scheduling problem. The objective considered is to minimize makespan. Two priority rules are developed as heuristic information based on Johnson's Rule and total processing times. A local search is used for improving the constructed solutions. The proposed ant colony algorithm is tested on the benchmark problem set of Taillard. The obtained results are compared with the previous implementations of ant colony optimization which are available in the literature. Computational results show that the proposed algorithm performs better than other algorithms when the number of machines is less than ten.

The Product Family Design Based on Axiomatic Design

Ping Jiang¹, Xiuping Zhao¹, Bojun Yang¹, Lingxuan Zhao¹, Runhua Tan¹

¹Hebei University of Technology, China

A product family comprises a set of variables, features or components that remain constant from product to product which called product platform, and other that vary from product to product. Modularization and commonality is the basic properties of product family and it demands that the architecture of product family should be decomposed into modules to perform different functions independently. Axiomatic design is introduced to aid to decomposing the function and structure with its framework of independence axiom to minimize the dependence of functions of product. The product family architecture of butterfly valve is design by this method and as a case study.

Performance Analysis of Single Shuttle and Twin Shuttle AS/RS

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²Kao Fong College, Taiwan

An Automated Storage and Retrieval System (AS/RS) can be equipped with the traditional single shuttle or the newly developed twin shuttle. There has been a significant literature on the comparison of single shuttle versus twin shuttle systems. Researchers agree that the twin shuttle system has better operating performance. However, the ratio of construction costs of a twin shuttle system to a single shuttle system is approximately 1.4. Therefore, given the same environment, the capacity or effectiveness of a twin shuttle system should outperform a single shuttle system by at least 40% to justify its cost.

This study uses Arena 8.0 to conduct the simulation experiment. We assume different rack shapes, time periods of storage and retrieval operations may or may not overlap each other, the locations of input and output stations may not be close, and there may be batch demands for storage and retrieval operations. Simulation results suggest that twin shuttle systems would be the better investment if the input/output stations are in separate locations, time periods of storage/retrieval operations do not overlap, or there are significant batch demands.

Session	G (09:00 - 10:30)
Topic	Engineering Economy and Cost Analysis
Date	Wednesday - December 5, 2007
Room	Venus I
Chairs	Sven Hvid Nielsen and Leonard Perry

A Study on a Transportation Market with Empty Equipment Repositioning

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This paper studies a stable freight transportation market with two firms providing transportation services between two locations. Demands for transportation service in two directions are heterogeneous in market size, price sensitivity and competition intensity etc. Firms make decisions on transportation prices. Realized demand in these two directions can be unbalanced. To sustain the business, firms have to reposition empty equipment from a surplus location to a shortage location. We build a mathematical model to study the pricing policy and outcome of competition between two firms. The pricing policy is either to achieve the balance of realized demands or treat the demand in each direction independently. Furthermore, we corroborate how the profit is affected by price sensitivity and unit repositioning cost. It is surprising to find that profit may increase with price sensitivity and unit repositioning cost in a competitive market

Extending the Undercut-proof Equilibrium to Asymmetric Settings

Fan-Chen Tseng¹

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The concept of Undercut-Proof equilibrium was proposed to analyze the differentiated product environment where a pure Nash equilibrium does not exist. However, previous analysis made the simple assumptions that consumers have the same switching costs and the firms have zero production costs. In this paper, a more realistic model is proposed that considers asymmetric switching costs for consumers and nonzero production costs for firms. With this extended model, firms can make more judicious pricing decisions in the highly competitive markets of e-Commerce.

Ecological Industrial Engineering and Eco-efficiency Analysis

Yin Qian¹, Chunfa Li¹, Zhaoguo Zhang¹

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With the increasing heavy pressure from environment and nature resource, people have taken innovative measures to free themselves from the present irrational economic development pattern, and strongly promote the development of circular-type and ecotype economy. The main tasks of eco-industrial engineering are to introduce the ideas of ecotype into the design of industrial system based on the theories of circular economy, and achieve the harmony of economic benefit and ecological benefit. In order to gain more effective utilization ratio of resource and lower environment pollution, eco-efficiency combines economy with environment. This paper based on researching eco-efficiency indicators system, pointed out eco-industrial engineering evaluation methods on account of the eco-efficiency.

Cost-transparent Sourcing in China Applying Total Cost of Ownership

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Asia, eminently China, is gaining in importance regarding manufacturing especially for high-volume, low-cost production. The request from industry in Switzerland to comprehend all costs related to global sourcing projects concerning China leads to the approach of total cost of ownership (TCO). In this paper, first a literature review regarding existing concepts with special focus on industry incentives, benefits, barriers and methods of structuring cost objects is conducted. Thereafter, an enhancement of the TCO approach is presented in order to achieve a holistic and transparent cost evaluation that takes supply chain risks into account. Concluding, methods for quantification of cost objects are discussed and evaluated critically.

Modelling Software Quality Costs by Adapting Established Methodologies of Mature Industries

Lars Karg¹, Arne Beckhaus¹

¹SAP Research, Germany

In the software sector, the calculation and modelling of quality costs have not achieved the maturity of other industries yet. In this paper, a model that bridges the gap between classic cost accounting and software development specific models is proposed. This model considers defect introduction and removal, and can be applied to different granularities. An implementation plan is suggested for its instantiation and explained exemplarily by a commonly used software quality model.

Evaluate Projects by Using Multiple Criteria Decision Making Techniques

Soheil Mahmoodzadeh¹, Mahmood Pariazar², Mohammad Saeed Zaeri³, Mohammad Ali Torkamani⁴

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In the economic analysis of projects available to the firm, the objective is to decide, from the economic data available, whether or not a given project is acceptable to the firm. There are four common methods of comparing alternative investments: net present value, Rate of Return, Benefit-Cost analysis and Pay Back Period.

In this article by utilizing improved Analytical Hierarchy Process by Rough set theory, firstly we try to calculate weight of each method. Then by implementing TOPSIS algorithm, assessment of projects has been done. Obtained results have been tested in a numerical example.

Session	H (11:00 - 12:30)
Topic	Ethics, Education and Training
Date	Wednesday - December 5, 2007
Room	Venus I
Chairs	HK Tang and Weihua Zhou

Integrating Kano's Model into E-learning Satisfaction

Ling-Hsiu Chen¹, Hsiang-Chih Lin¹

¹Chaoyang University of Technology, Taiwan

This study uses Kano's two-way quality model to measure e-learning system satisfaction and categorize their attribute. Through the four dimensions of the 15 questionnaire to measure user satisfaction with their classification and quality attributes. The research results indicate that all of the 15 service quality elements can be classified to 10 One-dimensional, 3 Attractive and 2 Indifferent quality elements. Through Better index and Worse index, this research also provides the best increase satisfaction elements and the worse decrease satisfaction elements to e-learning planners, and this result can be used as a reference for their resources deployment.

A European Union (EU) co-operation program: Integral, Innovative, Industrial Product design and development, I3PD2 and Project Led Education (PLE).

Sven Hvid Nielsen¹

¹Aalborg University, Denmark

Aalborg University's project-organised and problem-oriented studies were introduced Thirty-three years ago. The experience since then has proved this to be an important innovation in higher education. The primary aim is to teach young people, students to become useful members for industry and society. Other primary objectives are to ensure high-quality research and education and to enhance technology transfer and to stimulate industry-university partnerships within the EU and stimulate Inter-University co-operation programmes. In this project we are focusing on the importance of curriculum development, teachers mobility, ex-change of students and industrial co-operation.

Balance Score Card and Social Responsibility in Public Organizations

Toraj Mojibi¹, M.Bahador Aryanezhad², Mojtaba Tabari³, Soheil Khorshidi⁴

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Balance Score Card (BSC) is an integrated model with new function for evaluating the performance of organizations. This model the focus on organization strategies and creating Balance for perspectives (including financial, customers, internal processes and the growth and learning) tries to manage and evaluate complex organizations.

In present research, from among comprehensive models of performance evaluations, the BSC model was considered as a more appropriate research model for the evaluation of performance in public organizations. After theoretical studies and discovery interviews, social responsibility was added to BSC model as a new perspective, and intended measures in finance, citizen, and internal processes of learning and growth were identified and the research hypotheses were tested and verified.

After presenting the model, the importance rate or the weight of perspectives and measures were determined. Finally, with regard to the results the suggested comprehensive model of this research can be applied to the performance of public organization.

A Study on the Relation of the Manpower' Competency and the need of Educating & Training at the Manufacturers in Taiwan

Ming-Ta Wu¹, Yu-Shan Cheng², Guan-Li Chen²

¹National I-Lan University, Taiwan

²National Taiwan Normal University, Taiwan

Through analysis, about the relation between the degrees of competency and education & training need is correlation. When the staff's the degree of competency is higher, the degree of education & training need also rise relatively. Probing this result and find, facing the times of globalization, the enterprises face the predicament shortened by a wide margin in products life cycle, and the staff also face the challenge that the technical ability of knowledge upgrade fast. In manufacture, when the staffs work their jobs and the contents of case task, "Research and Development Competency", "Marketing Competency" and "Product Technology Competency" are important competencies for the job. Therefore the staffs have had the certain degree of knowledge and technology, they also hope that they can prove their competencies and meet the need of their own achievement by education & training.

Managing Opportunities in the Global Knowledge Society: A Dynamich Approach for Creating Values in Pmtio Development, Design and Manufacturing

Sven Hvid Nielsen¹

¹Aalborg University, Denmark

It is commonplace these days to say that knowledge is the most critical asset to be managed. Yet not many people - particularly not practitioners - invest very much time in learning about what knowledge really is and how different knowledge management (KM) is from information management (IM). Experiences from the Aalborg University experiment will be used as a case example with its unique use of problem-based education methods in connection with project and group-organised studies - to stimulate the professional learning process by a balancing of theory/practice, disciplinarily/interdisciplinary and by strengthening the link between research, education and practice. Innovation as suggested is creation of a new product-market-technology-organisation-combination (PMTO-combination) consisting of three key elements: 1) Innovation is a process and should be managed as such, 2) the result is at least one new element in the PMTO-combinations. 3) The extent to which the innovation is new may range from incremental, small step innovation, through synthetic innovation, i.e. the creative recombination of existing techniques, ideas or methods, to discontinuous, radical, quantum-leap innovation. Often new means: new, somewhere on the continuum, to graduate, University, industry...Society.

Study on Effects, Limits and Current Situation of E-Learning System - an Example on Small-median Enterprises

Chung-Hsuing Fang¹, Guan-Li Chen¹, Yueh-Ming Chiang²

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²Roche Products Ltd., Taiwan

With the advancement of information technology, the knowledge teaching of traditional educational training no longer catches up with the changes of economic environment. E-learning has become the weapon for enterprises to create competitive advantages in human resources. With advantages of convenience, great flexibility and timing, enterprises can create unique competitive advantages. While enterprises are introducing e-learning, they need to understand the internal needs and resources limits. After having overall understanding and evaluation, they select appropriate e-learning system to maximize the learning effects of the system. With methods including secondary data collection, arrangement & analysis and interviews with specialists, the researcher explores issues on e-learning for small-median enterprises, including 1) understanding the reasons and effects of implementing e-learning, 2) exploring the considerations and limits of introducing e-learning, 3) having interviews with specialist, scholars and owners of small-median enterprises on the limits, difficulties and future development and 4) offering practical suggestions and significant reference for those who are planning to or have introduced e-learning.

Session	G (09:00 - 10:30)
Topic	Human Factors (3)
Date	Wednesday - December 5, 2007
Room	Venus II
Chairs	Arun Garg and Qin Gao

Incorporating User Acceptance into Usability Evaluation Scheme for the User Interface of Mobile Services

Sangwoo Bahn¹, Cheol Lee¹, Jang Hyeon Jo², Won Yong Suh¹, Joobong Song¹, Myung Hwan Yun¹

¹Seoul National University, South Korea

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As the usability of mobile services has become a critical factor of success in marketplace, needs for established usability evaluation methodologies and realistic practices that ensure capturing usability in evaluation are increasing. From a viewpoint of user-centered design perspective, customer perceived value has recently gained much attention from usability experts and UI practitioners due to its important role in predicting purchase behavior and achieving sustainable competitive advantage. User perceived values on the newly introduced mobile services are diverse and they are changing rapidly. However, there is few appropriate evaluation methods to assess the usability of mobile services considering the customer perceived values. The purpose of this study is to propose an evaluation scheme incorporating user's subjective feelings on the usability of mobile services. Based on the customer perceived values on mobile services from FGI, appropriate usability principles related to UI design components, customer perceived values from the literature were synthesized for the development of evaluation indexes in the proposed evaluation scheme. Comparing with traditional evaluation methods, it is expected that the proposed approach might enable UI practitioners to capture what users really want as well as to secure the usability of mobile services quickly and easily in field.

The Strain Index to Analyze Jobs for Risk of Distal Upper Extremity Disorders: Model Validation

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²Texas A&M University, United States

In 1995, Moore and Garg developed a method to analyze jobs to determine risk of distal upper extremity disorders-The Strain Index. Since then the Strain Index has been used worldwide. This paper describes the Strain Index briefly, summarizes model validation studies, and likely future revisions to the model.

Fatigue Driving Detecting Model based on Momentum Indices and Neural-Fuzzy Approach

Cheng-Li Liu¹, Shiaw-Tsyr Uang²

¹Vanung University, Taiwan

²Ming-Hsin University of Science & Technology, Taiwan

Driver fatigue is recognized as an important factor in road accidents in worldwide. The fatigue-tracking technologies to prevent fatigue-related accidents have been widely discussed in the last decade. There is some evidence to suggest that subjective measures of fatigue do indeed correlate with performance decrements associated with fatigue. However, it is difficult to measure on-line. The study investigated the effect of tendency indices for actual driving performance measuring. A fatigue driving detecting model was proposed based on neural-fuzzy approach integrating driving performance measuring variables and tendency indices. This study has been performed using experimental data coming from 50 drivers. Results show that the model could achieve the same effect as subjective ratings.

The Effects of Different Breath Alcohol Concentration and Post Alcohol Upon Driver's Driving Performance

Yung Ching Liu¹, Chin Heng Ho¹

¹National Yunlin University of Science & Technology, Taiwan

A simulator study was conducted to investigate the effects of (1) different breath alcohol concentration (BrAC) consumption (0 mg/l vs. 0.25 mg/l vs. 0.40mg/l vs. 0.50mg/l) and (2) after drinking alcohol with ~BrAC=0mg/l upon driver driving behavior and subsidiary task performance. Two load road environments were developed, low vs. high, and each required approximately 20 minutes of driving. In addition to driving safely, participants were instructed to perform the CFF value and write NASA-TLX questionnaire. Eight participants (6 males; 2 females) with normal driver's license participated in this 2 x 4 within-subject experiment. Results showed that (1) the mental workloads after the drunk driving section is the largest, (2) the longer the drivers were on the road, the wearier the drivers felt, (3) high BrAC level (.5 mg/l) caused bad driving performance, and (4) complex road situations also increased the risk to driving safety. However, no significant difference between drunk driving and post-alcohol driving was found and that indicated that not only drunk driving affects traffic safety, post-alcohol impairment also affects traffic safety seriously.

A Method for Human Driven Knowledge Acquisition (Case Study in a Petrochemical Company)

Navid Nezafati¹, Ameneh Khadivar², Ehsan Afarideh¹, Seyed Mohammad Javad Jalali³

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³Islamic Azad University, North Tehran Branch, Young Researches Club, Iran

In this paper, techniques of human driven knowledge acquisition are briefly discussed and compared, then a case study of implementing knowledge acquisition (KA) in an Iranian petrochemical company is explained. In this project we've used a combination of KA techniques including semi structured interview, revised teach-back, commentary, laddering, repertory grid techniques in order to elicit both tacit and explicit knowledge of experts. This method is applicable in different kinds of industries with different branches in design engineering.

A study of supporting programs for small and medium enterprises: a first stage going to "Lean"

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Nowadays, firms should adopt new production management systems to be competitive. Toyota Production System (TPS) and Lean Production are attractive systems. They promise good results to firms applying their concepts (mainly based on waste elimination and continuous improvement). Although Lean and TPS seem to be easy to apply, the field study we present in this paper reveals that they are not easy to maintain. In this paper, we present the main results of our survey and propose primary solutions. We interviewed nine consultants that supported more than sixty firms in Haute Savoie (France). The major conclusions of this survey can be split in indisputable benefits - such as a new method of work, the implication of the manager as a preliminary condition to the Lean and the successful implementation of the tools of Lean - and persistent failings like an unsuited. That's why we propose research tracks focused on standardization and contributing management.

Session	H (11:00 - 12:30)
Topic	Facilities Planning and Management
Date	Wednesday - December 5, 2007
Room	Venus II
Chairs	Ponnambalam Sivalinga G and Prafulla Kulkarni

Solving a New Mathematical Model of a Closed-Loop Layout Problem with Unequal-Sized Facilities by a Genetic Algorithm

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¹University of Tehran, Iran

This paper presents a novel mathematical model of a closed-loop layout problem with unequal-sized facilities. This type of problem belongs to a class of combinatorial optimization, and NP-hard problems due to its complexity and high volume of computation. Obtaining an optimal solution for this complex, large-sized problem in reasonable computational time by using traditional approaches and optimization tools is extremely difficult. Thus, a meta-heuristic algorithm based on a genetic algorithm (GA) is proposed to solve the closed-loop layout problem. This proposed GA reports near-optimal and promising solutions in short period of time because of its efficiency. In this paper, a local search, based on 2-Opt algorithm, is also employed to improve the solutions obtained by the proposed GA. Finally, the computational results obtained by this algorithm are analyzed and compared with the results reported by the Lingo 8.0 software package.

Urban Road Interchange type Selection Based on Multiple Attributes Decision Making

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The issue of urban interchange type selection was discussed by using Multiple Attributes Decision Making (MADM). A theoretical model was proposed for interchange type selection based on MADM. Method and procedure of comparative alternative (corresponding to Pareto solution of MADM) generation was detailed based on capacity analysis and alternative improving. Considering deciders and engineers' partial favoritism information about evaluating indexes, a Q-operator T was introduced, the vertical matrix E was obtained based on graphic theory. In addition, the weighted utility matrix of every alternative was acquired for alternative ranking. Finally, the model was applied to one real interchange reconstruction work in Shanghai China. The results indicate that MADM can solve the problem of urban interchange type selection reasonably.

Applying a Revised VAM to a Multi-level Capacitated Facility Location Problem

Ying-Yen Chen¹, Hsiao-Fan Wang¹

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In this paper we developed a cost-varied Vogel-based approximation method, namely the Dynamic Vogel Approximation Method (DVAM), to solve a multi-level capacitated facility location problem (MCFLP), of which each client will be served by all levels of facilities with limited capacities. We discuss two kinds of MCFLP which are derived from two kinds of demand structures. The proposed algorithm is comparatively more efficient and accurate.

Audit Strategy for Improved Performability of Facilities Management

Tony Halim¹, Loon Ching Tang¹

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Facilities Management (FM) has evolved as a profession and academic interest over recent years. FM covers a wide spectrum of functions with the maintenance and operations task consuming the bulk of FM budget. A brief overview of FM is provided to highlight its increasing importance. This paper describes a systematic approach of conducting facilities audit; SPRINT. This approach enables management to determine services that are in need of attention and improvement. We identify the similarities of SPRINT to a typical Six-Sigma roadmap and provide a plausible integration of SPRINT with other established methodology synergistically into an analogous Six-Sigma roadmap for a holistic approach to ensure improved facilities maintenance management.

Inventory-Location Models for Remote and Direct Retailing with Time-Sensitive Demand

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²HEC, France

We investigate Inventory-Location Problems where customer demand is time-sensitive, i.e., demand decays with the delivery time. The problem is to find optimal number and locations for the facilities and how much inventory should be held at each facility so that the overall revenue is maximized. In the "customer choice" version of the model customers select the closest facility; in the "direct assignment" version, customers can be assigned to any facility. These two versions have parallels in traditional and internet-based retailing, respectively. A number of structural properties for the two models are established and efficient solution approaches are suggested. Computational results show that the ability to assign customers to facilities does not confer significant advantages to internet retailers.

A Conceptual Model for Knowledge Flow in Supply Chain

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In this paper we consider the knowledge flow in supply chain instead of material, money and information flows. The purpose of the paper is to suggest a conceptual model about knowledge flow in supply chain. We shows in this paper how KM activities create value in supply chain. In our perspective supply chains are competing to capture knowledge from environment and use it to gain competitiveness. Different partners in supply chain collaborate in knowledge creation, share and use and compete with others in the rate of externalization of the knowledge in their organization.

Session	G (09:00 - 10:30)
Topic	Maintenance Modeling and Engineering (1)
Date	Wednesday - December 5, 2007
Room	Jupiter I
Chairs	Li Bai and Mingchih Chen

Development of Integrated Model for Assessment of Operational Risks in Rail Track

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Rail operating risks have been increasing due to increasing number of axle passes, steeper curves, wear-out of rails and wheels and inadequate rail-wheel grinding, poor lubrication and reduced maintenance. In 2000, the Hatfield accident in UK killed 4 people and injured 34 people and has lead to the cost of £ 733 million (AUD\$ 1.73 billion) for repairs and compensations. In 1977, the Granville train disaster in Australia killed 83 people and injured 213 people. These are related to rolling contact fatigue, wear and poor maintenance. This paper focuses on development of a conceptual integrated model for rail grinding, lubrication and inspection maintenance decisions. Risk based cost benefit model is developed for optimal inspection intervals

Definition and Evaluation of Degree of Maintenance for Multi-unit Systems

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Degree of maintenance quantifies effort and effect of a general repair. It has been differently defined in the literature. For a given maintenance action, different definitions give different values. This paper gives a general definition of degree of maintenance, provides an evaluation method, and illustrates its appropriateness. The reasonability of the geometric process model is also examined for a specific system and a given maintenance policy.

A Combined Multivariate Technique and Multi Criteria Decision Making to Maintenance Strategy Selection

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Maintenance plays a key role in reliability, availability, products quality, risk reduction, increasing efficiency, Equipment safety. Miscellaneous strategies have been put forward for maintenance amongst which the most important ones are corrective, preventive, Opportunistic, Condition-based and predictive maintenance that considering each one's relevant industry each of them has advantages and disadvantages. In this article a methodology is proposed to select optimum maintenance strategy. in this methodology, we try to recognize effective variables (such as environmental problems, budget constraint, manpower utilization) By reviewing expert's notions and relevant specialized literature. Thereafter, by utilizing factor analysis, we will process the data so as to designate fundamental variables and summarize them in some factors. Then, we will apply the results obtained from factors analysis for designation of criteria in a hierarchy structure. Then by utilizing analytical hierarchy process, we will choose the best strategy; above mentioned stages have been used in a case study.

Optimal Spare Ordering Policy For Preventive Replacement With Age-Dependent Minimal Repair Under Cost Effectiveness Criterion

Jih-An Chen¹, Yu-Hung Chien²

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²National Taichung Institute of Technology, Taiwan

This paper develops a preventive replacement policy of spare ordering with age-dependent minimal repair and general random repair costs under cost effectiveness criterion. The spare unit for replacement is available only by order and the lead time for delivery the spare due to regular or expedited ordering follows general distributions. Introducing costs due to ordering, repairs, downtime and replacements, as well as the salvage value of system, we derive the expected cost effectiveness per unit time in the long run as a criterion of optimality. There exists a finite and unique optimum policy of ordering time which maximizes the expected cost effectiveness.

Effects of Preventive Maintenance on the Reliability of Production Lines

Lin Ma¹, Yong Sun¹, Joseph Mathew¹

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In determining failure characteristics in typical manufacturing production lines, workcells and components can have different failure patterns and distributions at the same time. The Preventive Maintenance (PM) of a production line is normally conducted on parts of machines or components in the system. Often, this type of PM does not restore the entire production line back to "as good-as-new" condition - the entire production line is generally 'imperfectly' repaired. A production line can be subject to multiple such PM actions over its operational life span.

In determining an optimal PM strategy, an accurate estimation of the effects of these PM actions on the reliability of production lines is essential. This paper addresses this issue at a component level using the Split System Approach (SSA). The repaired components are assumed to be connected logically with the rest of a system in series.

Most existing models consider the entire system and are based on the premise that the effect of PM is dependent on the characteristics of the failures of a system. This research revealed that the effect of PM depends on the characteristics of the failures of repaired components rather than the entire system.

Optimal Age-Replacement Model with Minimal Repair Based on Cumulative Repair Cost Limit and Random Lead Time

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²Kao-Yuan University, Taiwan

In this study, we consider an age-replacement model with minimal repair based on a cumulative repair cost limit and random lead time for replacement delivery. A cumulative repair cost limit policy uses information about a system's entire repair cost history to decide whether the system is repaired or replaced; a random lead time models delay in delivery of a replacement once it is ordered. A general cost model is developed for the average cost per unit time based on the stochastic behavior of the assumed system, reflecting the costs of both storing a spare and of system downtime. The minimum-cost policy time is derived, its existence and uniqueness is shown, and structural properties are presented.

Session	H (11:00 - 12:30)
Topic	Maintenance Modeling and Engineering (2)
Date	Wednesday - December 5, 2007
Room	Jupiter I
Chairs	Yu-Hung Chien and Renyan Jiang

Sensitivity Analysis for the Optimal Minimal Repair/Replacement Policies under the Framework of Markov Decision Process

Mingchih Chen¹, Chun-Yuan Cheng¹

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For the maintenance and replacement of system subject to stochastic deterioration, flexibility is an important consideration factor. Different possible maintenance policies are discussed in this paper where the failure distribution modeled by the Weibull distribution. The total discounted cost concept is very important in decision making for the complex system such as expensive capital equipment with operating life cycle lasting for years. A modified maintenance model is proposed with incorporating the costs of operating cost, the maintenance cost of minimal repairs, failure replacements and preventive replacements. We investigate different maintenance policies in the literature by modeling the deteriorating process of a system as a Markov decision process. Under the discounted cost criterion, the optimal parameters for the control limit policy are obtained. The sensitivity analysis of these control limits is performed for the flexibility of decision making. The optimal equations of the Markov decision process are solved by using the backward recursive scheme over a set of finite planning horizons to approximate the optimal policies for the infinite planning horizons.

Testing Strategies for Parallel-Series Standby Systems

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Surveillance test schedule have been studies to increase standby system unavailability and keep plant safety. In earlier research, testing strategies, such as simultaneous or uniformly staggered testing, have been studied for simpler standby system and the optimal test interval can then be obtained. For more complex systems, testing schedules were obtained by computer software or simulation with pre-specified testing strategies. In this study, three candidate testing strategies for parallel-series systems were developed based on the results of simpler systems. The performances of three candidate strategies are also been compared under both risk (considering only system unavailability) and decision (considering both system unavailability and maintenance cost) points of view.

The Optimal Periodic Preventive Maintenance Policy with Degradation Rate Reduction under Reliability Limit

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¹Chaoyang University of Technology, Taiwan

²University of Cape Town, South Africa

Preventive maintenance (PM) can slow the deterioration process of a repairable system and restore the system to a younger age or state. Many researchers focus on studying PM models for the cases of age or failure rate reduction and developing optimal PM policies. However, the PM actions, such as cleaning, adjustment, alignment, and lubrication work, may not always reduce system's age or failure rate. Instead, it may only reduce the degradation rate of the system to a certain level. Furthermore, most of the existing optimal PM policies result in very low reliability at the time of preventive replacement (PR). In practice, however, high reliability is usually required for a system to avoid failures being occurred. This paper is to develop an optimal periodic PM policy over an infinite time span by minimizing the expected cost rate with the consideration of reliability limit (R_{min}) for

Weibull-failure-time systems with degradation rate reduction after each PM. The proposed optimal periodic PM policy consists of two PM models. One model has fully periodic PM time-interval for every preventive replacement cycle; the other model has partially periodic PM time-interval where the time interval between the final PM and the PR is not a constant. For specified reliability limit, the proper model is chosen by using the algorithm provided in this paper. Examples are demonstrated and the sensitivity analysis is also presented for the proposed PM models.

Entropy Model with Application to Maintenance Policy

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It has been well-known from old times that the entropy model originated from information theory can be applied well to many fields of Operations Research and Marketing Science. This paper attempts for the first time to apply the entropy model to maintenance policies for reliability models. Replacing selection rate and purchase price in the entropy model with failure probability and planned replacement cost, respectively, the replacement time of an age replacement policy is obtained. This time is compared numerically with the optimal time of an age replacement when the failure time has a Weibull distribution.

Nonlinear Programming Solution for Optimum PM Schedule of Auxiliary Components

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Auxiliary components in some systems exist only to serve some other primary components. Preventive Maintenance (PM) activities are, therefore, done to these auxiliary components for the sake of extending the life of the primary component. Frequent PM care to auxiliary components increase the cost of PM while infrequent PM leads to increasing downtime of the primary component and, subsequently, production losses. The search for the optimal level of PM care requires a non-linear programming (NLP) solution that can, sometimes, be very complex. This paper suggests that a very useful pattern exists in the NLP model of this optimization problem which can significantly reduce the complexity of model formulation and the arrival to the NLP solution.

Survivability Analysis of Reconfigurable Systems

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This paper presents a new probabilistic approach to analyze the survivability of a system. We show similarities and differences between survivability and reliability analysis. In a reliability model, we can describe a k-out-of-n:G system ($k \leq n$), in which the component system is good only if any k or more components work. The system can also be configured into an initial k-out-of-n:G model with m backup components ($0 \leq m \leq n$). If the system cannot perform its intended function, the m backup components will be reconfigured with the remaining working components into a new form to sustain system function. We refer to such studies to calculate the system successful probabilities as the survivability analysis. In this paper, we focus on the survivability analysis of a simple piping system. This study could potentially be used to analyze the survivability of power network systems, computer network systems, military reconfigurable information systems, and other large reconfigurable network systems.

Session	G (09:00 - 10:30)
Topic	Information Engineering (1)
Date	Wednesday - December 5, 2007
Room	Jupiter II
Chairs	Masahiro Aruga and Hsien-Jung Wu

A Framework for Measuring Value in Business Interoperability

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To achieve Business Interoperability (BI), a comprehensive understanding of the business factors influencing its deployment is required, along with a frame-work that can contribute to the measurement of the inter-operability value of the enterprises involved in production networks. In this paper we have adapted and extended the Balanced Scorecard concept for assessing the value of business interoperability, which seems to be appropriate for this propose.

Multidimensional Data Mining of Association Patterns in various Granularities for Healthcare Service Portfolio Management

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Data Mining is one of the most significant tools for discovering association patterns that are useful for health services, Customer Relationship Management (CRM) etc. Yet, there are some drawbacks in existing mining techniques. Since most of them perform the flat mining based on pre-defined schemata through the data warehouse as a whole, a re-scan must be done whenever new attributes are added. Secondly, an association rule may be true on a certain granularity but fail on a smaller one and vice versa. And, they are used to find either frequent or infrequent rules. With regard to healthcare service management, this research aims at providing a novel data schema and an algorithm to solve the aforementioned problems. A forest of concept taxonomies is applied for representing healthcare knowledge space. Then, the mining process is formulated as a combination of finding the large-itemsets, generating, updating and output the association patterns that represent portfolios of healthcare services. Crucial mechanisms in each step will be clarified in this paper. At last, this paper presents experimental results regarding efficiency, scalability, information loss, etc. of the proposed approach to prove its advantages.

The Conceptual Model of Virtual Enterprise Business Strategy in Hyper-Competition Environment

Sayed Sajjad Moravveji¹, Ali Abdollahi², Neda Eghbali³

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³Shahed University, Iran

The main scope of this paper is to present a conceptual business strategy model that enables virtual enterprises to enter into the hyper-competition environment. Based on conceptual business strategy model that we propose, a virtual enterprise can create a continues series of temporary advantages in any or all of the four arenas of competition. This paper describes key research issues in effect of hypercompetition in virtual enterprise, based on business strategy model dimensions. the conceptual business strategy model represents a systematic framework for describing and analyzing the dimensions of strategic maneuvering in hypercompetitive environments. Furthermore, the conceptual business strategy model suggests that the applicability and value of the organizational dimensions varies with the level of competition.

Incremental Mining and Re-mining of Frequent Patterns without Storage of Intermediate Patterns

Fan-Chen Tseng¹

¹Kainan University, Taiwan

Data mining has been pervasively used for extracting business intelligence to support business decisionmaking processes. One of the most fundamental and important tasks of data mining is the mining of frequent patterns. When the transaction database is dynamic with data being updated constantly, incremental techniques must be used. Most techniques, though, adopt the "eager mining" approach that maintains a huge amount of intermediate patterns or data structures, which incurs expensive computational costs and consumes a lot of memory. Here an alternative "lazy mining" approach, called FP-impromptu, is proposed for incremental mining and re-mining of frequent patterns without storing intermediate patterns or massive data structures. Other possible applications and related issues of this approach are also discussed.

Spatial Credibilistic Clustering Algorithm in Noise Image Segmentation

Peihan Wen¹, Li Zheng¹, Jian Zhou¹

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An image segmentation algorithm based on credibilistic clustering algorithm incorporating spatial continuity is presented in this paper. The probabilistic constraint that the memberships of a pixel across clusters must sum to 1 in fuzzy c-means algorithm is removed, and credibility measure is introduced into image segmentation for the first time. By introducing a novel dissimilarity index in the credibilistic clustering algorithm objective function, the proposed algorithm is not only capable of utilizing local contextual information to impose local spatial continuity, but also allows the suppression of noise and helps to resolve classification ambiguity. Some important issues of the proposed algorithm are investigated, and the computational experiments are given to show the good performance of the proposed algorithm.

An Effective Particle Swarm Optimization Method for Data Clustering

I-Wei Kao¹, Chi-Yang Tsai¹, Yi-Chen Wang¹

¹Yuan Ze University, Taiwan

Data clustering analysis is generally applied to image processing, customer relationship management and product family construction. This paper applied Particle Swarm Optimization (PSO) algorithm on data clustering problems. Two reflex schemes are implemented on PSO algorithm to improve the efficiency. The proposed methods were tested on seven datasets, and their performance is compared with those of PSO, K-means and two other clustering methods. Results show that our schemes are both robust and suitable for solving data clustering problems.

Session	H (11:00 - 12:30)
Topic	Information Engineering (2)
Date	Wednesday - December 5, 2007
Room	Jupiter II
Chairs	Antonio Grilo and Johannes K. Chiang

An Augmented RBAC Structure for Collaborative Software Development

Hsien-Jung Wu¹, C. H. Sun¹, Bo-Da Lin¹
¹Asia University, Taiwan

The enterprise nowadays applies collaborative product development to reduce the product cost and improve new product development efficiency. The same situation is shown in developing a software project where even customers are invited to involve in the process of product development. In terms of data management, the system development in such collaborative environment is increasingly concerned with the problem of access control between users and operations. The problem becomes more complex due to various characteristics of different users and corresponding operations. This paper proposes an augmented role-based access control (RBAC) structure for the software project development dealing with software projects. The structure defines dimensions of workload, time and behavior based on basic RBAC concept. Access control issues that arise in a case of interface development of service software for the elderly are discussed. As a conclusion, recommendations are made for further research on access control of collaborative software development.

Design Process Reuse Based on Genetic Engineering

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Product design process has essential traits and behavior bearing an analogy with the genetic traits of organisms. Based on this point of view, this paper introduces an idea that genetic engineering into design process reuse. Firstly, types of process knowledge required in process reuse are studied. The extraction and representation of process bases are also discussed. Secondly, the design process gene model supporting process reuse are constructed according to the relationship between process bases and the ordered sequence of process base pairs and the relationship between process genome and design objectives. Thirdly, the design process reuse model is presented based on the mechanism of heredity and mutation of organism, which includes inheriting original process and adding new process gene. By using process gene model into design process reuse, the efficiency and quality of product design will be improved.

A Consideration of Information Content on the Basis of Semiotics Taking Account of Virtual Reality

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²Nihon University, Japan

Today on the field of information theory it is well known that the information content introduced by Shannon to be able to quantitatively describe the information is popular and based on the probability theory. But this theory express the quantitative object without considering the quality of information itself and cannot sufficiently express the information content to be considered of information essence from the semiotic view point. Especially the semiotic considering virtual reality on the Peirce's semiotics shows the un-sufficiency of reflection of information essence by such an information content as Shannon's information content. In this paper, firstly, the meaning of virtual reality and the Peirce's semiotic are reconsidered, secondarily, the discussion of cognitive processes as an evolution of semiotic is performed, and finally, the possibility of existence of various kinds of information content is proposed by consideration of semiotic structure of information essence.

Key Techniques about the Process Integration for Product Design

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The prevailing techniques or methods based on various engineering tools have been achieved many wonderful results. But in distributed environment, how these engineering tools effectively communicate and cooperate with each other inevitably becomes a very important factor in product development. So it is necessary to research the key techniques of process integration and application integration. Based on the analysis of the product development process, we divide the process into three levels according to different grains from macroscopy to microcosm. The three levels which can be called project management, workflow management and the design process level are analyzed in detail. In this paper, our research focuses on the fine-grained design process. We established a four-tier architecture which consists of representation layer, process control layer, services layer and repository layer for process integration. We use web services to realize the dynamic data integration between applications. Process Model (PM) is presented to describe elements in process. Data Context Model which represents various data in process and Behavior Model which controls the transformations of product data are explained in detail. The key techniques are developed as a prototype to prove the concept.

Research on Integration Platform Based on PDM for Networked Manufacturing

Xiaojun Meng¹, Ruxin Ning¹, Xu Zhang¹, Yu Song¹
¹Beijing Institute of Technology, China

To integrate and harmonize the disparate systems and heterogeneous data, an integration platform based on product data management (PDM) system is built. The logic framework about "user-process-application-data" of integration platform is presented to decrease the direct interaction between applications as less as possible. Information integration and application integration are achieved based on process-driven. The business process is defined and monitored by workflow engine provided by PDM system. Through developing the PDM system using the API and integration tool provided by PDM system, the data can be accessed each other between PDM system and other application system. The application is invoked by process according to the business logic. Finally, proceed from the characteristics of the networked manufacturing, the integration platform based on PDM system with the applicability of collaborative engineering and system engineering is built and the prototype system is established.

An Object-Based, Attribute-Oriented Approach for Software Change Impact Analysis

Chung-Yang Chen¹, Cheung-Wo She², Jia-Da Tang³
¹National Central University, Taiwan
²CyberLink Corp, Taiwan
³Chang Gung University, Taiwan

Change impact analysis is a critical issue in software project management. This paper presents an object-based, attribute-oriented approach for software change impact analysis. Such an approach handles changes in heterogeneous product items and yields a holistic impact result for the purpose of total quality management. A computerized prototype is implemented to demonstrate the theoretical work and the use of the proposed method.

Session	G (09:00 - 10:30)
Topic	Intelligent Manufacturing
Date	Wednesday - December 5, 2007
Room	Jupiter III
Chairs	Tung-Hsu (Tony) Hou and Yiping Lu

A Fuzzy Data-Driven and Rule-Based Reasoning System for Setting the Nano-Particle Milling Process Parameters

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¹National Yunlin University of Science & Technology, Taiwan

²Chihlee Institute of Technology, Taiwan

In this research, an integration of adaptive resonance theory (ART-2) neural networks, fuzzy set theory, variable precision rough set (VPRS), decision tree C5.0 algorithm and fuzzy rule-based control is proposed to develop a fuzzy rule-based reasoning system to set a nano-particle milling process. The characteristics of the proposed system are to use data-driven to do fuzzification and rule extraction instead of directly using domain experts. In addition, the regulation scheme of the parameter setting system is based on adjusting the process parameters by using its current deviation from the optimal parameters. The verified results show that the proposed process parameter setting system indeed can be applied to guide engineers to set the process parameters when a nano-particle milling process is shifted. It can be applied to adjust the milling process from current shift condition back to near-optimal condition.

Recognition of Semiconductor Defect Patterns Using Spectral Clustering

Chih-Hsuan Wang¹

¹Ming Chuan University, Taiwan

Diverse defect patterns shown on the wafer map usually contain important information for quality engineers to find their root causes of abnormalities. Today, even with highly automated and precisely monitored facilities used in a near dust-free clean room and operated with well-trained process engineers, the occurrence of spatial defects still cannot be avoided. This research presents a spatial defect diagnosis system and attempts to solve two challenging problems for semiconductor manufacturing: (1) To estimate the number of clusters in advance, and (2) To separate both convex and non-convex defect clusters at the same time. In this paper, a spatial filter is used to denoise the noisy wafer map and to extract meaningful defect clusters. To isolate various types of defect patterns, a hybrid scheme combining entropy fuzzy c means (EFCM) with spectral clustering is applied to the denoised output. The proposed approach is validated with an empirical wafer bin maps obtained in a DRAM company in Taiwan. Experimental results show that four kinds of mixed-type defect patterns are successfully extracted and classified.

Modeling the Valuation Process of Silicon Intellectual Property in the Semiconductor Industry

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²National Central University, Taiwan

³National Chiao-Tung University, Taiwan

The complexity of IC (Integrated Circuit) design increases as semiconductor fabrication miniaturizes. Assembly of the reusable basic components of the IC design process has become valuable in accelerating development and marketing of new IC applications. As a result, the idea of SIP (Silicon Intellectual Property) has emerged to meet this demand. The purpose of this paper is to develop a SIP valuation model. However, assessing such intangible assets cost high and have a time-consuming negotiation process to safeguard performance. After intensive interviews with SIP providers, we model a SIP valuation process, which incorporates with quality signals, links to the SIP intermediaries, and augments with the industry dynamics. The results are further suggested to support with Internet SIP malls, which are installed to take the advantages of multimedia interface and real-time archive for facilitating the SIP valuation processes.

Control of Roundness on Turned Cylindrical Bars using Artificial Neural Network

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The emergence of government legislations in environmental matters has lead to improvements in machining processes in the recent years. Dry machining is one such attempt in which the use of fluids has been minimized. In this sense, the study of dry turning process is important.

In a study by Marcos-Barcena et. al. (2005), the macrogeometric deviations (roundness) of UNS A92024 (Al-Cu) cylindrical bars turned dry under specified conditions of imposed cutting (cutting speed and feed) were reported. They established an exponential relation between roundness and the cutting parameters. For the ongoing research related online control of turning process, neural network was selected due to its capability to adapt to changes in surrounding environment. Hence, the relationship established in earlier study has been used for training and comparative study of Back propagation (BP) and Quick propagation (QP) neural networks. The results show that, overall, BP was the best algorithm for the application tested. The present study serves as an input for predicting the required process parameters for on-line control of roundness in turning process.

Assistance Ontology of Quality Control for Enterprise Model Using Data Mining

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There are many quality domains in which ideas and concepts about quality are represented. The intelligent Discovery Assistants Ontology of data mining (DM) processes was presented to compose and select the large space and non-trivial interaction in quality control for enterprise. We use a prototype to show that Quality Control for Enterprise Model is using the virtual enterprise quality ontology. A simple, but typical DM process was presented in the paper, which included preprocessing data, applying a data-mining algorithm, and post processing the mining results. It provides users with systematic enumerations of valid DM processes, in order that important, potentially fruitful options are not overlooked and effective rankings of these valid processes by different criteria, to facilitate the choice of DM processes to execute. Deeply research in the quality and ontology area is realized in protégé with the format of OWL. Assistance ontology has the function to help mining workers selecting the algorithm, how to help selecting algorithm, the one prerequisite is that establishes good data mining method ontology. The intelligent Discovery Assistants search and deduct in the quality ontology. Finally, a study case is given to explain the practical application with the fault diagnosis bases on ontology, and was given encouraging results.

Comparison of Two Flow Analysis Software for Injection Moulding Tool Design

Iwan Halim Sahputra¹

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Main objective of this paper is to discuss comparison the results of injection moulding process simulation analysis generated by particular software with those obtained in a small-scale industrial process. The samples were produced by 'Dasset' Injection moulding machine at laboratory. Component was modelled using Rhinoceros Computer Aided Design (CAD) software. Simulation analysis was performed using Moldflow Plastics Insight (MPI). Two different positions of gate were selected for simulation to investigate the accuracy of the software. Polyethylene (PE) and High Impact Polystyrene (HIPS) were selected for analysis and production. Comparison with the samples showed that MPI predict maximum pressure needed to fill the mould cavity accurate. MPI predicted flow path and weld lines graphically those were similar to the machine's process. SIMPOL does not provide such results. It was not possible to compare with the machine's result because of the machine's problem. In addition to these results, MPI generated more simulation analysis report of injection moulding process.

Session	H (11:00 - 12:30)
Topic	Design Chain Management
Date	Wednesday - December 5, 2007
Room	Jupiter III
Chairs	Chih-Hsing Chu and Roger Jiao

Business Model Innovation through Collaborative Product Development: A Case Study of Design Services in Taiwan

Chih-Hsing Chu¹, Han-Chung Cheng¹

¹National Tsing Hua University, Taiwan

Due to the ever-increasing global competition in the market, most Taiwan companies have attempted to transform their business from OEM to ODM, and thus continue to create niche values. "One-stop Shopping" design services have emerged as an innovative business model during this trend, particularly in high-tech industries. In this model, a design company collaborates with various manufacturing companies integrates different core competences, leverages individual resources, and thus offers complete product development services as a virtual enterprise. International customers can outsource NPD as a whole to the service team through a leading design company. This paper describes such a business innovation based collaborations of SME's. Important findings regarding the innovation are generalized from a case study, including value creations, potential risks, and enabling methods. Finally, we propose a protection buffer theory that facilitates the execution of this business model.

Product Design with Consideration of Contingent Costs: A Design Function and Variation Risk Management Perspective

Chun-Ying Shen¹, Jung-Wei Sun², Yu-Jing Lin², Shuo-Yan Chou²

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²National Taiwan University of Science & Technology, Taiwan

This paper proposes an optimization model simultaneously deals with the tolerance allocation and visible manufacturing and contingent cost to satisfy the product design functions. The constrained optimization of product variation allocation (identifying of self-make process and purchasing quality/specification level) minimize the main costs, i.e. self-make manufacturing cost and purchasing cost, and contingent costs, such as rework, replace, reverse logistics, and damage on reputation under above conditions.

A Simple Multi-Objective Optimization Approach for Material Purchasing Problem of a Railway Transportation Business

Yiping Lu¹, Jianzhong Cha¹, Yingshuai Zhao¹, Jingjuan Meng¹

¹Beijing Jiaotong University, China

A railway transportation business is characterized by its dispersed location, integrated management style, and huge material requirement. In this business, material purchasing of the whole station system is central governed, the quantity is big, thus unsuitable material decision will induce huge lose. To avoid this, both 'from whom to purchase' and 'how the disseminate routing should be' need to be optimally decided. If we go even further, the whole forepart supply chain structure needs to be wisely designed. Aimed at the problem's character, the authors of this paper give a simple but utility optimization model. The model is based on a linear transportation model (LTM) with its fee parameters synthetically defined by an analytic hierarchy process (AHP) to capture the multi-object optimization requirement. According to the authors' rudimentary test, the model is easy to operate and can serve as an initiation assistance tool in a supply office of a railway transportation business. A concise review of recent research on supply chain optimization is also given in the paper.

A Study on Modular Design Representation

Yuan-Ping Luh¹, Chih-Chin Pan¹, Jian-Wei Su¹

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Faced with the pressure of shortened product life cycle, most enterprises are looking for the ways to reduce the inventory cost and enhance the service level. As stated by many researchers of related fields, modular design is an efficient method using product varieties to fulfill customer satisfactions. However, the discussion of modular design often excludes its graphical representation which renders the resultant illustration inconsistent and incomplete. This inadequacy results in poor communication between product designers and development engineers.

This paper thus proposes a modeling language, named Modular Design Modeling Language (MDML) and based on UML (Unified Modeling Language), to develop a concise illustration for the results of modular design. The paper also proposes an element illustration methodology to represent the basic elements of the results of modular design, such as physical structure, component, function, and interface. Product designers can deliver the modular design results containing such elements as physical structure diagram and functional structure diagram.

Finally, an example of LCD TV modular design is also demonstrated to validate the feasibility of MDML.

An Approach to Improve the Efficiency of Configurators

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Configurators have been generally accepted as important tools to bridge the gap between customers' needs and company offerings in the form of specific instances of product platform. To date, improving the efficiency of configurators is a big challenge for both the academic research and the current practice in the competitive global marketplace. In this paper, a new configurator design approach is presented to tackle the configuration task in an efficient manner by providing adaptive and customized configuring sequence for individual customers to best match his preference towards the products. To represent and manipulate the probabilistic nature of customers' preferences, Bayesian network is deployed to reflect the product physical structure and the likelihood of the customers' potential preferences among components. The configuring process is modeled as an uncertainty elimination process and an information theory based algorithm is applied to obtain customers' targeted configuration. The idea is to sequentially select the component with most relevant information for a customer to configure from the remaining components pool based on his previous steps' specification. A case study is reported to demonstrate the feasibility and potential of the proposed method.

A Case Study of Obsolete Part Procurement Process Reengineering

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Obsolete part procurement has to be inevitably dealt with especially in the electronic industry. Business Process Reengineering (BPR) has been adopted as an effective approach which can significantly improve performance of procurement process. BPR requires that there exist a fundamental and a proven, reliable methodology, which are generally applicable and repeatable. Towards this end, this paper presents the fundamental and methodology of procurement process reengineering based on accountabilities and activities. And then Flextronics, which is a low volume and high mix electronic manufacturing service provider, is used as a case study to analyze obsolete part procurement process and implement procurement process reengineering for obsolete parts.

Session	G (09:00 - 10:30)
Topic	Production Planning and Control (2)
Date	Wednesday - December 5, 2007
Room	VIP
Chairs	Reza Tavakkoli-Moghaddam and Loo Hay Lee

A New Hybrid Intelligent Method for Assembly Line Balancing

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²South-East Asia University, Thailand

A new hybrid intelligent method for solving assembly line balancing problems is proposed in this paper. The tabu search (TS) method and the genetic algorithm (GA) are combined to identify and provide solutions for assembly line balancing problems. The approach is named the TSGA-based method. With the proposed approach, the TS method can well address the number of tasks assigned for each workstation, whereas the GA can also assign the sequence of tasks for each workstation according to precedence constraints. In this paper, four single-model assembly line balancing problems from a survey of literature are tested against the proposed approach. From the simulation results compared with the conventional method, it was found that the proposed TSGA-based method is capable of producing solutions superior to the conventional method. It can be concluded that the TSGA-based method is an alternative potential algorithm to solve assembly line balancing problems.

The Use of a Memetic Algorithm in Operations Scheduling of Cellular Manufacturing Systems with Makespan

Reza Tavakkoli-Moghaddam¹, Ahmad Ali Bozorgzad², Yousef Gholipour Kanani²

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This paper presents a group scheduling problem for manufacturing cells, in which parts may visit different cells. By addressing intra-cell scheduling, the sequence of parts within manufacturing cells is determined. In inter-cell scheduling however, the sequence of cells is obtained. Due to the complexity of this problem, a memetic algorithm (MA) is proposed to solve such a hard problem. The performance of proposed MA is shown and evaluated on 10 test problems. The computational results reveal that the proposed MA performs better than the Lingo software in these test problems with respect to the average elapsed time to obtain makespan.

A Method of Reducing Complexity of Product Based on TRIZ

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Introduce complexity theory proposed by N.P. Suh. There are four kinds of complexity in product: real complexity, imaginary complexity, combinatorial complexity and period complexity. The design with the least complexity is the best design. A method of reducing complexity of product based on TRIZ is put forward. Complexity existed in the permanent flow valve system is reduced and the reliability of the system is improved by using this method.

Automatic Seasonal Auto Regressive Moving Average Models and Unit Root Test Detection

Siana Halim¹, Indriati N. Bisono¹, Melissa¹, C. Thia¹

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It is well known that in the reality, sequential data more likely exhibit a non-stationary time series or a seasonal non-stationary time series than the stationary one. Therefore, a hypothesis is needed for testing those properties in the time series. Various tests are available in the literature; however in this study unit root test of Dickey Fuller, Augmented Dickey Fuller and Seasonal Dickey Fuller test are applied. Moreover, a forecasting program is designed by using R 2.3.0. This program executes raw data and gives information of the best time series model in the sense of minimum AIC (Akaike Information Criterion). By using this program, a user who doesn't have a grounded background in time series analysis will be able to forecast a short-period of future value of time series data accurately.

The analysis of data consists of Box-Cox transformations, unit root test, removing unit root and seasonal components, finding the best time series model for the data, parameter estimation, models diagnostic checking, and forecasting of the future value time series.

Do Inventory Management Practices affect Economic Performance? An Empirical Evaluation of the Machine Tool SMEs in Bangalore

Rajeev N¹

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Inventory management (IM) has a decisive role in the enhancement of manufacturing industry's competitiveness. Therefore, major manufacturing industries are following IM practices with the intension of improving their performance. However, the effort to introduce IM in SMEs is very limited due to lack of initiation, expertise, and financial constraints. This paper aims to provide a guideline for entrepreneurs in enhancing their IM performance, as it presents the results of a survey based study carried out for machine tool Small and Medium Enterprises (SMEs) in Bangalore. Having established the significance of inventory as an input, we probed the relationship between IM performance and economic performance of these SMEs. To the extent possible all the factors of production and performance indicators were deliberately considered in pure economic terms. All economic performance indicators adopted seem to have a positive and significant association with IM performance in SMEs. On the whole, we found that SMEs which are IM efficient are likely to perform better on the economic front also and experience higher returns to scale.

A New Demand Forecasting Paradigm'Customer-Centric Individual Demand Forecasting'

Zhongjun Tang¹, Xiaohong Chen¹

¹Central South University, China

An increasing trend towards forecasting individual demand is occurring due to customers demanding their orders for individual products be fulfilled under short delivery time. The basic principles, forecasting process, handicaps, and enabler of a new demand forecasting method, named customer-centric individual demand forecasting, were proposed.

Session Topic	H (11:00 - 12:30) Advanced Planning and SCM in Process Industry
Date	Wednesday - December 5, 2007
Room	VIP
Chairs	Hans-Otto Guenther and Norbert Trautmann

A MIP/RCPSP Decomposition Approach to Short-Term Planning in Chemical Batch Production with Non-Identical Parallel Processing Units

Norbert Trautmann¹, Rafael Fink², Hanno Sagebiel², Christoph Schwindt²

¹University of Bern, Switzerland

²Clausthal University of Technology, Germany

We consider the problem of planning and scheduling physical and chemical processes on a multi-product chemical batch production plant. Such a plant consists of several multi-purpose processing units and storage facilities of limited capacity. Given primary requirements for final products, the problem consists in generating an appropriate set of batches for each process and scheduling the processing of those batches on the processing units subject to different types of technological constraints. In the literature the short-term planning problem is generally modeled as a monolithic mixed-integer linear program. Due to the combinatorial nature of the problem, those models generally cannot be used when dealing with problem instances of practical size. In this paper we propose a two-level approach which is based on a decomposition of the problem into a batching and a batch scheduling problem. We formulate the batching problem as a mixed-integer linear program, which allows for considering the execution of processes on alternative processing units with unit-specific lower and upper bounds on the batch sizes. The batch scheduling problem can be solved using a specific method known from the literature. We report on computational results for a sample production process from the chemical engineering literature.

A Priority-Rule Based Method for Scheduling in Chemical Batch Production

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²University of Bern, Switzerland

We present a priority-rule based method for a scheduling problem arising in chemical batch production. The problem consists in scheduling a set of operations on the processing units of a multi-purpose chemical batch plant in such a way that the production makespan is minimized. An operation transforms one or several input products into one or several output products. In general, each operation can be executed on several alternative processing units. Certain intermediate products can be stocked in storage facilities of limited capacity, whereas chemically instable intermediates have to be consumed immediately. Moreover, a changeover may be necessary between the processing of different operations on the same processing unit.

The problem is distinguished by the presence of both material-availability and storage-capacity constraints. Consequently, already the problem of finding a feasible schedule is NP-hard. That is why classical priority-rule based methods cannot be used. In the literature, a two-phase approach has been proposed, dealing with both kinds of inventory constraints separately. In the present paper we devise a new priority-rule based method where the two types of constraints are treated jointly. The main idea is to allow for partial schedules causing capacity overflows at storage facilities and to deduce temporary latest start times of operations from the time points at which the capacity overflows occur. Each time such a latest start time cannot be met, an unscheduling procedure is called, which introduces appropriate release dates for operations having caused the respective overflow. We report on the results of an experimental performance analysis comparing the new method to state-of-the-art algorithms from the literature. The analysis shows that in particular for large problem instances, our method is able to significantly improve upon the results of the previous algorithms.

Network-wide Campaign Planning for Multi-stage Processes in the Chemical Industry

Markus Meiler¹, Hans-Otto Guenther¹, Martin Grunow²

¹Technical University Berlin, Germany

²Technical University of Denmark, Denmark

Nowadays, manufacturing in process industries mostly takes place in branched supply networks consisting of several plants which are located at different sites and linked by complex logistics relations and material flows. Thus, a key issue of production planning and scheduling is the coordination of plant operations at different production stages considering the supply of intermediates and their transportation between various plants. This planning effort has to cope with the limited availability of resources as well as numerous storage and transportation constraints. Time-consuming and expensive setup and cleaning activities require production to be carried out in so-called campaigns. Identical production tasks are repeated in succession to reduce these unproductive times. In our paper, we propose an application-oriented approach for supply network planning in the chemical industry which is based on a novel aggregation scheme and a network flow formulation of the problem. The optimization model uses a continuous representation of time. Our approach generates a comprehensive schedule for coordinating the production activities at all plants in the network.

An MILP Model Application for Supply Network Planning in the Production of Chemical Commodities

Hans-Otto Guenther¹, Matthias Kannegiesser¹

¹Technical University Berlin, Germany

A global supply network planning model for application in the production of chemical commodities is presented. Major modules of the model formulation reflect sales, distribution, production, and procurement activities. The objective of the model is to maximize profit by coordinating all activities within the supply chain. The model formulation is related to a real industry case.

Application of Analytical Network Process on Supplier Selection to Hazardous Substance Management in Green Supply Chain Management

Chia-Wei Hsu¹, Allen Hu¹

¹National Taipei University of Technology, Taiwan

With increased environmental consciousness, this paper presents an analytic network process (ANP) approach to incorporate the issue of hazardous substance management (HSM) into supplier selection. In this study, identification of criteria of HSM competence is categorized into four dimensions, a multi-criteria decision model is proposed. ANP then is applied to supplier selection and is characterized by interdependencies among decision structure components. An illustrative example in an electronics company is presented to demonstrate how to select a most appropriate supplier in accordance with the requirements of HSM for environmental regulations.

Research on Information Increment and Demand Information Value in Supply Chains

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The concepts of information increment and demand information value in supply chains are defined, and then the measurement methods of them are established basing on the theory of information science. The mechanism of demand information influencing the ordering process and the wholesaler's expected benefits is clarified by building a supply chain ordering model. The relationship between information increment and information value is studied, when assuming the demands are uniformly and normally distributed. The results of the analysis and the simulation experiment prove that there is a positive correlation between information increment and information value, and the information increment can influence the information user's benefits. The results suggest that it is necessary to establish an effective information evaluation system for members in supply chains to increase their benefits by improving the quality of decision information.

Session	Poster Session
Date	5 Dec 2007 Wednesday
Display Time	09:00 - 11:30
Interactive Session	10:30 - 11:00
Room	Venus III

The Analysis and the solving of Local Protectionism in Passenger Transportation between adjacent cities Based on Game Theory

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Local protectionism between cities always blocks the development of social economy, which puzzles the managers. This article has mainly analyzed the cause and the representation of this problem. And then the quantization model is found based on the Game Theory, which can analyze the interest relationship between government and enterprise measurably. The relationship between local protectionism and social welfare will be given by the model and the idea of turning passenger transportation to public transport is advised based on the result of the analysis and the case. Eventually, the detailed measure and suggestion was advised to avoid local protectionism and increase the social welfare.

Application of Grey Programming in Irregular Flight Scheduling

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The sources of irregular to airline schedules are many, including crew absences, mechanical failures, and bad weather. When these unexpected events occur, airlines recover by replanning their operations. This paper introduces the application of grey programming in crew rescheduling. The arrival time of crews are grey variables at the beginning of the irregular flights resuming phrase, but few authors considered it. In this paper, a grey programming method is introduced to solve the crew rescheduling problem. A mathematical model for this problem including grey parameters is presented and a grey simulation technology based on heuristic procedure is proposed to get the optimal results. The feasibility and effectiveness of the model and method are verified by the simulation results.

Predicting Movement Directions of Stock Index Futures by Support Vector Models with Data Preprocessing

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Due to the nature of high-leverage, generous remuneration can be earned by small capital investment. Therefore, analysis of futures prices becomes one of the most interesting topics in financial markets. Recently, by applying the structure risk minimization principle, support vector machines (SVM) approach has been one of the most power techniques to dealing with classification problems. In this investigation, trading information including technical indicators is employed by SVM model to predict movement directions of Taiwan stock index futures prices. Due to data preprocess has essential influence on prediction accuracy of SVM models, preprocessed data provides by different methods are used to examine impacts on prediction performance of SVM models. Experimental results reveal that the SVM approach has the best performance when data are processed by scaling and differencing operations.

Research on Key Strategic Factors of Chinese Coal Enterprises' Sustainable Development

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In this paper, the authors analyze the internal situations and external surrounding faced by Chinese coal enterprises, and with sustainable development as a goal, discriminate and abstract four key strategic factors: the quality and controlling capability of the coal resource, the internal management system and structure, the capital operating capability and the integrated development capability. Finally some strategic suggestions and solutions are put forward to control and mobilize these factors.

A New Method for Huge Group Decision-making

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With the appearance of the issue of huge group decision-making and the status quo that group-aggregation decision is only effective for small-scale groups, this paper firstly designs an improved Minimum Fuzzy C-means (MFCM) based on Minimum Connected Dominating Set Algorithm (MCDSA), and then, through defining the group-preference vector, group-consensus index and group decision value, the paper puts forward a new method to deal with huge group aggregation by making use of MFCM. As is shown by simulations and control analysis, the new method could effectively resolve the problem of making decisions for a group with a membership of over 600.

A Model of Manufacturing Quality Information Supporting Design

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Quality information produced in manufacturing process is tightly related to product and process design decision-making. However, manufacturing quality information is rarely taken into considerations by product and process designers. It is also difficult for designers to capture quality information. Firstly, the demands for manufacturing quality information supporting product and process design decision-making are analyzed in this paper. Then requirement model of manufacturing quality information supporting design decision-making is given. Thirdly, according to the manufacturing quality information three-layer representation framework based on STEP standards mentioned in our previous research, manufacturing quality information representation in application layer is studied. Fourthly, the paper describes model of manufacturing quality information supporting design decisions using IDEF0 diagram. Finally, through some investigation of design process of heavy vehicle transmission, a model of manufacturing quality information supporting transmission design decision-making using IDEF0 diagram is proposed.

The Use of Fuzzy Analytic Hierarchy Process to Confer the Core Factors of 3G Mobile Telecommunications' Content Use

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Despite the continuing growth in the number of mobile phone service subscribers, the problem of dropping average revenue per voice communication user urges mobile telecommunication services providers to include 3G mobile telecommunications services and applications as a major source of revenue. To understand subscribers' preferred and valued 3G mobile telecommunication services and designs, this study applied Fuzzy Analytic Hierarchy Process, in addition to content analysis, interview, and questionnaire survey, to evaluate 3G mobile commerce design criteria. The results of the study suggest that increased mobile telecommunication bandwidth allows the offering of more value added services. However, MTSPs need to take into consideration of their subscribers' individual needs of information services. Timely and pragmatic services with humanized designs help to increase subscribers' usage of mobile telecommunication services, leading to a higher profit margin for MTSPs.

Assessment on the Enterprise's Operational Performance Using Multiple Attribute Decision Making

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For the sake of meeting and greeting the era of mobilized technology, the relevant manufacturers produce relevant products one after another, such as notebook computer, it gradually becomes the user's most favorite product. In recent years, the development of notebook companies is very fast. According to the information from Market Intelligence Center (MIC) in 2005, it showed that there was a significant growth in NB market, and because the market competition was intense, the notebook companies need to face more challenges. This study starts from the

viewpoints of financial performance, the analysis and comparison tools would be Grey Relational Analysis of Multiple Attribute Decision Making and TOPSIS analysis, and the financial statements from the website of Market Observation Post System are adopted in order to establish a short-term assessment model for the sake of assessing the best and worst notebook companies. The displayed rankings that based on these two kinds of analytical results are still slightly different; the reason of difference is that this study has added the feature weighting value for calculation, which led to different rankings, but the overall performance of the manufacturers displays high consistency.

A New Financial Engineering Model for Analyzing the Royalty of BOT Projects: The Taiwan Case

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This paper uses the financial engineering concept to compare build, operate, and transfer (BOT) projects with non-BOT projects. The comparison reveals that there exists a difference in financial flow framework between BOT and non-BOT projects and that the benefit cost ratio (B/C) or self-liquidation ratio (SLR) cannot be used to analyze the financial plan although some earlier studies have used either of them to evaluate the financial feasibility of BOT projects. Moreover, this study construct a new financial investment evaluation model which includes the private construction cost ratio (PCCR), government construction cost ratio (GCCR), royalty, and government finance recovery ratio (GFRR) for analyzing the financial characters of BOT projects. In addition, this paper conducts a case study on the BOT concession of the Container Terminal in Taipei Port to find the solutions of PCCR, GCCR, royalty, and GFRR. Results of the case study show that the new BOT financial model could be used to interpret the financial characters of BOT projects

A Methodology to Determine the Cost of Spare Part for Choosing the Best Mode of Shipment

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Many companies face the challenge of keeping on stock large inventories of spare parts (SP) & bearing excessive holding & obsolescence costs. Thus, for them, the effective cost analysis can be an important tool to evaluate the effects of stock control decisions related to SP. This paper proposes a methodology for reducing the imposed costs. In order to enable the company to predict the demand level through an experimental algorithm, it presents a case study in the real world for calculating the price of each SP before its purchase. Choosing the optimum mode of shipment for variety of SP to be ordered, is the final intention of this research report.

Study of Construction Bidding System Based on Combination of Rough Set Theory and Back-propagation Network

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The estimation of optimum markup percentage is a critical activity for a contractor to win the tender. It is affected by many factors. This paper presents a novel method of markup estimation combining rough sets (RS) theory and back-propagation (BP) network for construction project. RS theory is utilized as a preprocessor to delete the redundant irrelevant factors to the project markup. Then the relevant factors are used to train the BP network and predict the project markup. Actual prediction results show that the performance of RSBP model combining RS theory and BP model is superior to that of BP network with higher global convergence ability and higher computing speed. In addition, the mean relative error of RSBP model is also smaller than the BP model.

Forecasting Electricity Consumption by Separating the Periodic Variable and Decompositions the Pattern

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Electricity consumption pattern has been affected by some socio-economic and environment factors like consumers and environmental fluctuations. Due such parameters electricity consumption pattern will demonstrate various seasonal, monthly, daily and hourly variations. With this type of diversity, it is difficult to find the appropriate model to estimate. In this article it is attempted to decompose the pattern by clustering primary date and eliminating the periodic variance. The complicated pattern is changed to a set of simple patterns which easily could be used in point of view of macro decision making to determine the parameters affected on consumption pattern and forecast detailed executing consumption that is mainly used by middle management and technical engineers. Improved results with descriptive estimation for any part of consumption pattern are concluded in any time intervals.

Case Study of Picking Method Selection for Cosmetic Broken-case Picking Operation

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Order picking has been seen as the most labor-intensive and costly activity for almost every warehouse; the cost of order picking is estimated to be as much as 55% of the total warehouse operating expense. From literature review, it is understood that in addition to storage equipment policies, the proper use of retrieval equipment and picking regime can improve picking performance. The retrieval equipment types, picking regime and information tools for broken-case picking are discussed and considered in this paper. The paper details the order profile analysis in order to select an efficient and effective picking strategy solution for the cosmetic broken-case picking operation. This paper will show a reasonable, practical and easy approach of the selection process for the cosmetic broken-case picking operation.

Single-Machine Scheduling to Minimize the Number of Early Jobs

Rong-Hwa Huang¹, Chang-Lin Yang¹

¹Fu Jen Catholic University, Taiwan

This study proposes a novel method to determine the minimum number of early jobs on a single machine, and demonstrates that this problem can be solved in polynomial time. The method's complexity is $O(n \log n)$. This study also provides computational performance of this method on problems with various sizes.

An Inventory Model with -Rational Type- Backlogged Demand Rate and Quadratic Backlogging Cost

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In this paper, we consider a single item inventory model with a mixture of backorders and lost sales, in which the demand during the stockout period is partially backlogged according to a rational type function. The parameters associated with the purchasing cost, selling price, ordering cost, goodwill cost, demand rate and holding cost per unit and unit time are constant, but the cumulative backordering cost per unit is a quadratic function of the length of time for which the backorder exists. A procedure is developed for determining the optimal policy and the minimum total inventory cost. Illustrative numerical examples, which help us to understand the theoretical results, are also presented.

Use Genetic Algorithm in Production and Inventory Strategy

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This paper is to study when enterprises facing time varying and from a single supplier. The availability of the supply may face natural disaster, labor strike, production defects, mechanical failures, or other impact events. This research was to establish a model to solve the dynamic problems in between production and inventory. Use genetic algorithm to reduce the overall average cost.

According to the different ordering policy to determine production cycle to evaluate performance in order to find the optimal policy is not only to balance production and inventory levels, also maintain finished products and raw materials in reasonable levels.

A Composite Weighted Multi-objective Optimal Approach for Emergency Logistics Distribution

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Improving the efficiency of distribution in emergency logistics research, which would decrease disaster damage in the other side. A new composite weighted multi-objective optimal approach for distributing commodities was constructed in this paper, which feature in including penalty function in objective functions, as well as time and cost during the transshipment in urgent relief distribution centers were considered in constraints. Then, a simulation experiment analysis about a disaster such as earthquake occurred in Nanjing, Jiangsu province, was illustrated to indicate that the new model can be used by decision maker during an actually disaster relief efficiently.

Scheduling Performance Evaluation in Hybrid Production Environments

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The configurations inside firms are most often neither pure flow-shop nor pure job-shop in practice. A scheduling performance evaluation is proposed to extend and integrate several ideas into a research framework where results can be referred to real-world manufacturing situations. The investigation therefore composes in which some of simple and popular scheduling rules are examined in hybrid shops comprising both job-shop and flow-shop. The average flow time is specifically the principle performance measure taken into account to estimate how closely the rules accomplish jobs relative to their due dates. The research effect indicated that the SPT rule is oftentimes preferred to cater for customers' requests and CR is of a kind to the contrary. In addition, this paper supplies a basis for extending the conclusions beyond the boundaries of the specific scenario presented with some believability. Regarding the computational results the approach has the potential to be applied to practical hybrid manufacturing systems and can probably obtain desirable performance by using either of these rules as the basis while using some of the very elementary rules researched over years in considerably unrealistic operations research models.

Scheduling Multiple Orders with Preemptive Jobs and Resource Dependence Times

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Scheduling with preemptive jobs and resource dependence times is a problem that operation managers face everyday in service-oriented environments, and the computational complexity of the problem also limits the solution techniques available. A proposed scheduling model, which integrates simulation, genetic algorithms and decision support tools, is to solve the scheduling problem with preemptive jobs and resource dependence times involving multiple orders on multiple operation stages. The object of this study is to seek the minimum total tardiness of overall orders, and three subordinate objects are also considered for making decisions in operation management. A numerical example is solved to illustrate the proposed model. The results demonstrate better performance than is achieved using several popular dispatching rules.

Optimum Production Planning Model under Probabilistic Market Demand

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An Optimum Production Planning (OPP) Model for a robot-served machine in the make-to-order (MTO) industry is proposed to minimize the production cost under deterministic order quantity and deadline constraints. The operational cost of the machine and the part handling robot, as well as the fixed costs for both equipments and the product holding cost are considered

simultaneously into the objective of the model. This study not only implements the Lagrange Method to resolve the production planning problem, but also provides a verified cost-related property of the Lagrange Multiplier for budget and/or cost forecasting under the deterministic market. Through the forecasted future demand, the step-by-step algorithm to reach the optimal production plan for the probabilistic market is then constructed. In addition, the versatility and adaptability of this study are exemplified through numerical simulation. This paper surely contributes the applicable solution to control a robot-served machine under certain market, as well as to plan the productivity of the machine and the robot in the forecasted future.

Manpower Allocation in an Asynchronous Production Line with Leveled Labor

Kuang-Yao Wu¹, Hong-Feng Lai¹, Chung-Yen Ho¹

¹National United University, Taiwan

Allocations of the buffer, the server and the workload for enhancing productivity are commonly addressed in serial production lines. This paper presents a framework for allocating the manpower in an asynchronous production line, where operators are leveled into several degrees of skill. Throughput is considered as a performance index for measuring a manpower plan. A max-min-sum linear fractional model is proposed to find a promising workload allocation. Based on the preliminary model, an approach for dispatching each operator to appropriate stations is developed. Furthermore, a formula for estimating the requirement of the buffer space is given. In extension, the proposed model can be employed to analyze the problem of capacity expansion with workforce and machine additions.

A Study of the EPQ Model Using Fuzzy AHP When Fflaw of the Products or Unreliable Machineries Exists

Chih-Yao Lo¹, Jai-Houng Leu¹, Cheng-I Hou¹

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The methods to solve production problems usually assume the production process for the machines completely reliable and the products are perfect. This has the quite big difference with the production system in the reality. The enterprise is often facing many uncertainties in the production planning choice. Such as unreliability of the machineries, the quality differences, the finished product slight defect problems, and imperfect internal processes caused possible shortages and so on. The passed related researches usually emphasis a single issue or consideration, or make the model too complicated to use. Therefore, this study is to investigate the possible impact of Economic Production Quantity (EPQ) model decision-making factor. Use EPQ model to explore the most economical choice production cost factor based on the uncertainties may exists.

A New Process Capability Index under Multiplicative Adjustment of Process Mean and Its Demonstration Procedures

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In the process capability study, it has been undisputedly assumed that the standard deviation of a quality characteristic is unchanged even if its mean is adjusted for the purpose of process centering. However, this assumption is not valid for the case of the multiplicative adjustment of the mean, which appears more commonly in practice. In addition, little research has addressed the issue of "process capability demonstration". In this paper, a new process capability index is proposed for the nominal-the-best characteristic under the multiplicative adjustment of the mean, its lower confidence limit is derived, and a demonstration procedure is developed so that the required sample size can be determined to achieve a desired probability of successfully demonstrating that the process capability index meets the target with a specified level of confidence.

The Impact of ERP Implementation on Corporate Supply Chain Performance

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Enterprise Resource Planning (ERP) and Supply Chain Management (SCM) represent important technology investment options for operations managers, and have been acclaimed in the practitioner and academic literature for their potential to improve business performance. ERP systems provide benefits in the area of transaction automation; SCM systems provide more sophisticated planning capabilities. This paper focuses on the interactions between ERP and SCM. A conceptual framework was proposed. The framework is featuring the ERP benefits, firm competences, and supply chain performance. It became clear that there exists close interrelations in benefits of implementing ERP system and SCM performances. We apply rough set theory (RST) to discover important ERP attributes leading to the success of SCM.

A Multi-period Ordering Policy in Supply Chain

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Supply chain management (SCM) is seen as a set of practices aimed at managing and coordinating the whole supply chain from raw material suppliers to end customers and develops greater synergy through collaboration along the whole channel. Traditionally, a newsboy model can be employed in a single period and single product ordering model of a retailer. In this paper, we extend the classical newsboy model to solve a multiple period ordering and pricing policy between a manufacturer and a retailer. We consider a single product which is subject to uncertain demand which is a function of price. The proposed model can determine the quantity of the retailer ordering from the manufacturer by considering maximizing the profit of the channel. A numerical study is conducted to attend qualitative insights into the structures of the proposed policy. The numerical results show that the solutions generated by the proposed policy outperform that by the independent policy or fix ordering quantity policy in the profits of the retailer and overall channel.

Identifying Efficient Cane Growers and Exploiting Their Expertise in Improving Inefficient Ones

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The objective of this study is to distinguish efficient cane grower from the less efficient ones using qualitative and data envelopment analysis. Using this method, thirty efficient growers were identified. The strategic plan drawn from comparing efficient growers and inefficient ones is as follows. 1) Using efficient growers to benchmark farm activities that need to be improved, including activities relating to tillage, plant, herbiciding, fertilizing, irrigating. 2) Strengthening the farming skills of growers who own land with sandy loam soil that is susceptible to weather condition change. 3) Making the expansion of the mill's cane-growing land a priority, expanding to loamy clay to sandy loam, implementing irrigation system. 4) Develop business process mapping of efficient growers to improve inefficient ones individually.

Research on Supply Chain Disruption Coordination Mechanisms under Algebraic Demand and Asymmetric Information

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This paper studies the optimal decisions of a supply chain involving one supplier and one retailer with asymmetric information after the retailer's cost was disruption. We consider two scenarios: coordination mechanism under asymmetric information in a regular scenario and in an irregular scenario (with retailer's cost disruption). Our research shows that, it is optimal for the supply chain to keep the original coordination mechanism if the retailer's cost change is sufficiently small. Decisions must be remade if retailer's cost change is larger. We illustrate the results by numerical analysis.

Decision-making for the Optimal Number of Suppliers Considering Trade-off between Supplier Management Cost and Supply Failure Risk

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This paper puts forward an optimization model to minimize the total costs including supplier management cost and risk loss cost based on the analysis of the trade-off relationship between supplier management cost and supply failure risk, in which the optimal number of suppliers is dependent variable. Then the sensitivity analysis of the relationship between the optimal number of suppliers with the proportion of management cost to the total cost, risk loss cost, and supplier reliability are made respectively. Some advices for decision-making on how to choose suppliers in different circumstances are concluded finally.

Optimal Pricing Strategy for Queuing Systems with Balking Loss and Reneging Loss

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The lost profit from lost business is quite difficult to be estimated for the queuing systems with cyclic demands. My previous work presented a creative and effective approach to formulate waiting cost as balking loss plus reneging loss. Using the estimation of waiting cost may allow decision makers to have the capability to determine the optimal number of servers for each planning period. Unfortunately, some queuing systems have trouble in extending the number of servers to earn more profit. Hence, an alternative way, the optimal pricing strategy, can be used to solve this capacity constraint problem. In this paper, the balking index and reneging index are introduced and formulated with discount level as three key parameters on maximizing the total profit.

A Case Study of Applying Spectral Clustering Technique in the Value Analysis of An Outfitter's Customer Database

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This case study applies the spectral clustering technique in the value analysis of the customer database of an outfitter in Taipei, Taiwan. By considering gender, birth date, zip code, shopping frequency, and the total spending, the spectral clustering analysis found six clusters among 551 member customers from the company's database. In addition to the clustering analysis, different promotion strategies based on two recency-frequency-monetary based loyalty strategies matrices for the members of different clusters are provided. The analysis shows that Clusters 5 and 3 are the two most important groups and one group of customers may have to be abandoned to save the company's marketing resources.

The Business Model of Internet Application Services for Telecommunications Operators

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This paper discusses the business model of Internet application services through dividing the application services into four categories: content-based business, information-based business, advertisement business, and product transaction business. This paper tries to analyze the business model from the perspective of value chain, especially focusing on cooperation relationship. The analysis of this paper is about four major businesses of the Internet application services through the method of case study of V-net which was launch by China Telecom. Based on these models, this paper discusses how to cooperate among the participants on the value chain and proposes different patterns of cooperation ship. It also compares different models and concludes the advantages and risks of these models.

Finite Element Method Modeling and Analysis for Aeronautic Synchronous Generator with Damper Windings on Unloading and Short-Circuit Conditions

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Nowadays Finite Element Method (FEM) has been one of the focus issues on analyzing electromagnetic machines. To investigate the dynamic characteristics of aeronautic synchronous generator with damper windings, electric circuit model with damper windings has been established and two-dimensional transient solution has been executed in this paper. FEM results on unloading and short-circuit conditions with Magnet of Infolytica corporation have verified the accuracy and feasibility of ever growing electromagnetic coupling method.

A Simulation Model of Bullwhip Effect in a Multi-Stage Supply Chain

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Bullwhip effect has always been considered as one of the critical problems in a supply chain that negatively influences costs, inventory, reliability and other important business processes especially in upstream agents. This problem has become even more critical due to the increased complexity of global supply chains. This paper proposes a simulation model to quantify a bullwhip effect in a multi-product, multi-stage supply chain which their agents release their order based on inventory level. Generic models based on system dynamics approach are proposed to create specific supply chain to quantify a bullwhip effect as well as to reduce such effect. The supply chain of 'R.O.O Water' was selected to validate and demonstrate the flexibility of the proposed model. The result showed that the difference was never more than 1% for quantifying the bullwhip effect. Moreover, the proposed model allows user to find an optimal set of parameters to reduce total bullwhip effect by adjusting parameters manually or using optimization function.

A Planning Support System For System Of Systems Engineering

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This paper describes a planning system for SOSE(System of Systems Engineering). Based on the analysis of the characteristics of the planning for SOSE, the architecture framework of the planning system is introduced, which not only supports the process design and organization design, but also monitor of SOSE process. A plan representation is proposed for planning SOSE, which emphasizes on the system of systems (SOS), courses of action (COA), organization and budget. Finally, a planning process is discussed, especially COA design.

Modeling and Verifying Web Service Composition Using Colored Petri Nets Based On WSCI

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Current Web services composition proposals, such as Web Service Choreography Interface (WSCI), provide no mechanisms or tool support for the verification of service composition in the design, when describing the control and message flows in service collaboration. For solving this problem, this paper presents an approach for transforming the composition language WSCI into colored Petri nets (CPNs) so as to effectively verify the model with existing CPNs-specialized tools. The colored Petri nets model of a typical use case "Plan and Book Trip" is then constructed, analyzed, verified and simulated as prototypes of WSCI models with the CPNs tools.

Development of Surface Roughness Prediction Model Using Response Surface Methodology in High Speed End Milling of AISI H13 Tool Steel

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This paper presents a study on the development of an effective method to predict surface roughness for high speed end milling of AISI H13 tool steel using PCBN inserts. The response surface methodology (RSM) has been utilized for the postulation of a second order quadratic model in terms of cutting speed, axial depth of cut and feed. Sufficient numbers of experiments were run based on the Box-Wilson central composite design (CCD) concept of RSM in order to generate roughness data. The ANOVA technique has been used to verify the adequacy of the model at 95% confidence interval. From the model it was found that feed plays the most dominating role on surface finish followed by the cutting speed. However, axial depth of cut does not have significant effect on roughness value. The roughness tends to decrease with decreasing feed and increasing cutting speed.

Knowledge Access Control Policy Language Model for Virtual Enterprises

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Collaborating throughout a product lifecycle via virtual enterprise (VE) is one of the most promising strategies for enhancing global competitiveness. Efficient and secure knowledge sharing is critical to the success of a VE. First, this study proposes an ontology-based knowledge access control model for knowledge sharing in a VE. In the proposed model, user authorizations permitting access to knowledge in a VE are classified into two levels: basic privileges and extended privileges. The former are evaluated from four-dimensions, i.e. who, what, when and where, while the latter is determined by considering how three domain ontologies, i.e., product, organization and activity, are related. Based on the proposed knowledge access control model, a knowledge access control policy language model is developed to identify the knowledge access control and sharing rules of a VE and all its enterprise members. The knowledge access control model and the policy language model proposed in this study can facilitate VE Knowledge management and sharing across enterprises, enhance knowledge sharing security and flexibility and regulate knowledge sharing to expeditiously reflect changes in the business environment.

The Research Status of Complex System Integrated Health Management System(CSIHM) Architecture

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Complex System Integrated Health Management (CSIHM) technology is developed from the Fault Detecting, Isolation and Reconfiguration (FDIR) technology; which is the integrated application of the advanced reasoning technology, artificial intelligence technology, sensor technology and information management technology. CSIHM can effectively manage the health states of many kinds of complex system for reducing the maintenance cost of an overall system and make sure the accomplishment of mission and the safety of crews by detecting the system malfunctions earlier and make deal with them automatically. Recent years, most of presented health management models, such as ISHM, IVHM and PHM etc. can be put in the category of CSIHM. This paper firstly presents the goal which CSIHM must be achieved and its activities, and then has an analysis and comparison of some representative CSIHM architectures combining with some typical cases emerged from their development course, at last presents that use the technique of concurrent engineering to conduct the design of CSIHM and the design of complex system managed by CSIHM simultaneously, the design of user interface and the development of core engine is the difficulties and hotspot problems in the research of CSIHM architecture.

The Limitations of the Technology Roadmap and Importance of New Management Tools in Science-based Innovation: the Case of Nanotechnology in Japan

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Since 2000, nanotechnology has become a remarkable technology field and has been largely expected to create science-based innovation. This field, however, has such characteristics as high complexity and uncertainty of the feasibility of technological realizations, most private firms would not be able to take on enormous risks by themselves against a large amount of investigation required to commercialize nanotechnology. Consequently, public-private interaction becomes necessity, and national and local governments need an effective technology management tool to build a long-term strategy for nanotech realization and commercialization. This report indicates although a technology roadmap has been noted as a tool in building a long-term strategy, there would be problems and limitations because of the technological and market uncertainties of this new research field.

Knowledge Management Approach in Mobile Software System Testing

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Software testing is the last phase in the Software Development Life Cycle (SDLC) which aims to test and capture any defects before the software is being deployed. System test is more concentrated on black box testing whereby the functionality and integration between software, hardware and computer system is tested. Motorola Global Software Group Malaysia, Penang (GSG Penang) is the core test team for iDENTM phone software system testing. The main activity of iDENTM phone software system test is to conduct phone software functionality test, mobile data (such as GPS and circuit data call) test as well as software stress test through the iDENTM network simulation in Penang. This paper discusses the proposal of implementing test knowledge management framework in iDENTM phone software system testing and how the knowledge management approach can benefit the testing team in terms of cost and productivity.

Knowledge Sharing and KM Effectiveness in Technology R&D Teams: Transactive Memory System and Team-based Outcome Expectations Perspectives

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R&D process can primarily be considered as a knowledge management (KM) process. In particular, knowledge sharing/transferring is perceived to be the most essential processes for knowledge management. Organizations rely on many kinds of work groups such as R&D teams to develop technologies, improve services and manage operations. Thus, this study proposes a group level research model which includes transactive memory system, network tie, team-based outcome expectations and trust to examine knowledge sharing in technology R&D teams. Besides, the relationship between KM effectiveness and knowledge sharing is also examined in technology R&D teams. Our research model is assessed using data from a sample of 248 members of technology R&D teams and is analyzed using PLS method. The results of this study indicate: (1) transactive memory system and team-based outcome expectations can facilitate knowledge sharing; (2) trust and network tie can facilitate transactive memory system and (3) knowledge sharing has no effect on KM effectiveness. This study also discusses implications for the technology R&D teams based on the results of this study.

Disruptive Process Innovation in Semiconductor Industry

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Firms concentrate more in capturing market by performing product innovations as their key strength. However the key to increase the market share is in their strategy: apart from enhancing the product performance they should concurrently focus in the process innovation, which involves in both technological and business processes. Earlier researches have shown disruptive innovation as a distinct difference from the continuous and radical innovation in product development. However in this study it is shown that it can be extended to process type innovation of high tech industries. For every product there is a close relationship between the product development and its manufacturing process, hence knowledge transfer and technology diffusion between the two teams is crucial to explore and exploit each other's strength. Secondly, to enable process innovation, emphasis should be made to introduce the concept of modularity and flexibility in a product's manufacturing process. Accordingly, this paper introduces a framework for concurrent product and process development that will help a firm to achieve a highest level in its competitive strategy.

Binomial Distribution Based Approach to Deriving Time Series Weights

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Information aggregation is an essential process in many fields like mathematics, economy, biology, engineering, management, medicine and military affairs, etc. A variety of techniques have been developed to aggregate argument information collected at the same period. However, it seems that there is little investigation on the aggregation process of arguments collected at different periods, in which time series weights play an important role and thus should be highly emphasized. In this paper, we introduce a time series weighted aggregation (TSWA) operator, and propose an approach based on the binomial distribution probability density function and its inverse form to deriving the time series weights associated with the TSWA operator. Then, we give a detailed analysis of the properties of the derived time series weights.

Applying Critical Chain in Project Scheduling and Estimating Buffer Size Based on Fuzzy Technique

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Project scheduling has long been an area of intensive research. Aiming at the problems in the current Scheduling Management based on classical network scheduling techniques, this paper analyzes the principles of the theory of critical chain and the applications in project scheduling management, and discusses the principles of project buffer under the comparison of critical chain and classical network scheduling techniques. However, in the real world, project activities are subject to considerable uncertainty, which affects the performance of project scheduling management. A fuzzy method is researched to estimate the buffer size in critical chain scheduling to reduce the uncertainty degree. The test results indicate the evaluation based on fuzzy technique can improve the performance of project schedule. The future works are mentioned in the end.

AUTHOR INDEX

A

A., Srividya p.77
A.K., Verma p.77
ABA-BULGU, M p.75
ABDO, Jamil p.58
ABDOLLAHI, Ali p.94
ABRAMOV, Oleg p.82
AFARIDEH, Ehsan p.90
AGGOUNE, Riad p.49
AHI, Arshia p.86
AHMADIZAR, Fardin p.87
AKSEN, Deniz p.87
AL HEMYARI, Zuhair p.84
ALARD, Robert p.61, 47, 88
ALBINO, Vito p.72
AL-GHAZI, Anas p.83
AL-MISHARI, Salman p.93
AL-SHAREEF, Khaled p.83
ALZEBDEH, Khalid p.58
AMER, Yousef p.43, 48
AMIN, AKM Nurul p.104
ANDERS, O. p.63
ANG, Beng Wah p.53
ANISSEH, Mohammad p.50, 51
APPA IYER, Sivakumar p.72
ARAS, Necati p.87
ARKAT, Jamal p.87
ARONSKY, Dominik p.79
ARUGA, Masahiro p.95
ARYANEZHAD, M.Bahador p.60, 86, 89
ASANO, Yoko p.45
ASHRAF, Muhammad p.43, 48
ASHTIANI, Behzad p.60, 86
ATEME-NGUEMA, Barthelemy p.85
AZADEH, Ali p.101
AZEM, Sadia p.49
AZIZ, Nur Arina Bazilah p.72

B

B. KHOT, Sandeep p.48
BAARS, Henning p.42
BAHN, Sangwoo p.90
BAL, Jing p.53
BAL, Li p.93
BAL, Zhonghang p.75
BANKI, Mohammad Taghi p.58
BARZINPOUR, Farnaz p.87
BASHIR, Hamdi p.58
BASSETTO, Samuel p.84
BAYRAM, Armagan p.64
BECKHAUS, Arne p.88
BENNIS, Fouad p.66
BENYOUCEF, Lyes p.48
BERMAN, Oded p.91
BHUIYAN, Nadia p.58
BHUSHI, Umesh p.65, 81
BI, Luyan p.104
BI, Ran p.52
BISONO, Indriati N. p.98
BISWAS, Saroj p.93
BONJOUR, Eric p.59
BOSE, Indranil p.43
BOUABANA-TEBIBEL, Thouraya p.80
BOURAS, Abdelaziz p.41
BOZORGZAD, Ahmad Ali p.98
BREMEN, Philipp p.61, 47, 88
BU, Xiangzhi p.49
BUSSE, Tim p.53
BUYUKOZKAN, Gulcin p.46
BYUN, Jeoung Woo p.85

C

CAI, Cunqiang p.43
CAI, Fei p.65
CAI, X. Q. p.71
CAILLAUD, Emmanuel p.62
CALISIR, Fethi p.41, 64
CAO, Jian p.80
CAPIZZI, Giovanna p.57
CARRASQUEIRA, Manuel p.69
CASTAGLIOLA, Philippe p.57
CASTILLA, Cesar p.60
CH.S.N., Chandra Sunil Kumar p.51
CHA, Jianzhong p.81, 97
CHAAR, B. Fayech p.73
CHAI, Chunfeng p.69
CHAI, Kah-Hin p.105
CHAKPITAK, Nopasit p.41
CHAKRABARTY, Ayon p.67
CHAN, Kai-Ying p.40
CHANG, Betty p.52, 46
CHANG, En-Chi p.103
CHANG, Kai Yi p.64
CHANG, Michael C.S p.76, 100
CHANG, Seok Ho p.49
CHANG, Shann-Bin p.42
CHANG, Shu-Min p.42
CHAO, Keng-Hui p.59
CHAO, Kiekang p.47
CHARTNIYOM, Siradej p.71
CHATTOPADHYAY, Gopinath p.49, 92
CHATZIMICHAILI, Anna p.78
CHEN, Bai-Sheng p.50
CHEN, Chie Bein p.54
CHEN, Chin-Chun p.64
CHEN, Chui-Cheng p.104
CHEN, Chung-Yang p.59, 95
CHEN, Frank Y p.70
CHEN, Gongyu p.48
CHEN, Guan-Li p.89
CHEN, Hsiao Ching p.68
CHEN, Huifen p.57
CHEN, Huimin p.54
CHEN, Hung-Yi p.66
CHEN, Jian p.
CHEN, Jih-An p.92
CHEN, Jin p.44, 65
CHEN, Kai-Ying p.81
CHEN, L. T. p.103
CHEN, Ling-Hsiu p.89
CHEN, Long-Sheng p.56
CHEN, Mingchih p.93
CHEN, Mu-Chen p.56, 81
CHEN, P.K. p.47
CHEN, Pei-Chi p.59
CHEN, Rongqiu p.49, 65
CHEN, Rui p.52
CHEN, Shou p.46, 47
CHEN, Tsung-Yi p.104
CHEN, Wen-chen p.47
CHEN, Xiaohong p.98, 100
CHEN, Xuhui p.96
CHEN, Yidong p.60
CHEN, Ying-Yen p.91
CHEN, Yow Mow p.76
CHEN, Yue-Yang p.41
CHEN, Yuh-Min p.104
CHEN, Yun p.100
CHEN, Yun xiang p.54
CHEN, Yung-Hsin p.47
CHENG, Alfred Li-Pin p.96
CHENG, Chun-Yuan p.57, 93
CHENG, Han-Chung p.97
CHENG, Li-Ping p.54
CHENG, Liwei p.85

CHENG, Weiqing p.104
CHENG, YiLi p.76
CHENG, Yu-Shan p.89
CHENG, Yuyen p.57
CHIANG, Johannes K. p.47, 68, 94
CHIANG, Jui Hsiang p.76
CHIANG, Yu-Chen p.76
CHIANG, Yueh-Ming p.89
CHIEN, Yu-Hung p.92
CHIOU, Richard p.85
CHIU, Anthony SF p.76
CHIU, Chih Chou p.78
CHOI, Hoogon p.86
CHOU, Feng-Chin p.47
CHOU, Hsiao-Ying p.56
CHOU, Hsin-Chuan p.56
CHOU, Shuo-Yan p.97
CHU, Chih-Hsing p.97
CHU, Hui-Chuan p.104
CHUANG, Shan-Ping p.102
CHUNG, William p.74
CLAUSEN, Uwe p.48
COOK, Deborah F. p.78
CRAINIC, Teodor G. p.74
CRUZ-MACHADO, Virgilio p.61, 69, 94

D

DA GAMA, Victoria p.67
DAL, Ting-Jung p.51
DAL, Yusen p.45
DALESSANDRO, Don p.93
DANDAGI, Shivaprasad p.65
DANGELMAIER, Manfred p.63
DAO, Thien-My p.85
DASHTI, Mohammad Ali p.50, 51
DAUTZENBERG, Kirsti p.69
DAUZERE-PERES, Stephane p.49
DAVIS, John p.79
DENG, Jian-Lun p.102
DENG, Xinguo p.104
DESOUZA, Daniel p.43
DING, Hua p.70
DING, Jianguo p.61
DING, Shuquan p.42
DISSEL, Marcel p.41
DODANGEH, Javad p.51
DONG, Ming p.84
DONG, Qing p.93
DU, Donglei p.82
DU, Jun p.97
DU, Shichang p.83
DUFFUAA, Salih p.83
DULMET, Maryvonne p.59
DUNNE, Tim p.57

E

EGAWA, Akira p.95
EGAWA, Hiroshi p.95
EGHBALI, Neda p.94
ELMI, Amir p.81
ENGELBRECHT, Andries P. p.54
ERKAN, Tugce p.75
ERSOY, Mehmet Sakir p.46
ESMAEELI, Behzad p.58

F

FAN, Liwei p.53
FAN, Zao p.45
FANG, Chung-Hsuing p.89

FANG, Lina p.104
 FANG, Quangen p.43
 FARJAMI, Yaghob p.50
 FAROOQUIE, Jamal p.62
 FAROOQUIE, Parveen p.59
 FENG, Cheng-Min p.101
 FENG, Fan p.40
 FENG, Ying p.71
 FERRESE, Frank p.93
 FEYZ, Adel p.58
 FEYZIOGLU, Orhan p.46
 FINK, Rafael p.99
 FISCHER, Xavier p.66
 FISSE, Frank p.78
 FONG, Cher-Min p.77
 FOWLER, John p.78
 FRANCE, Dan p.79
 FRANK, Lauri p.66
 FRIZON DE LAMOTTE, Florent p.75
 FRONIA, Philip p.78
 FU, Qing p.72
 FUJIMURA, Kaori p.45
 FUNK, Jeffrey p.40

G

GAO, Fan p.45
 GAO, Jinyong p.73
 GAO, Qin p.45
 GAO, Yun-hong p.104
 GARCIA-LAGUNA, Juan p.101
 GARG, Arun p.90
 GASPARIN, Henry p.81
 GEISKOPF, François p.62
 GEMELLI, Nathaniel p.79
 GENG, Lixiao p.42
 GEORGILAS, Ioannis p.83
 GERSHWIN, Stanley p.49
 GHADERI, Farid p.75, 101
 GHANNADPOUR, S.Farid p.73
 GHAREHGOZLI, Amir Hossein p.72
 GHAZAVI, Sean p.82
 GHAZINOORY, Sepehr p.87
 GHOLAMI, Saiedeh p.86
 GHOLIPOUR KANANI, Yousef p.98
 GHOSEIRI, Keivan p.73, 74
 GOH, Thong Ngee p.57, 60, 84
 GONEN, Amnon p.60
 GONG, Lin p.86
 GOTO, Hiroyuki p.81
 GOUW, Gerard p.58
 GRILO, Antonio p.94
 GROBLER, Jacomine p.54
 GROVER, Sandeep p.69
 GRUNOW, Martin p.99
 GU, Jiajun p.45
 GUAN, Hai-ling p.66
 GUAN, Zailin p.78
 GUENTHER, Hans-Otto p.99
 GUHA, Shion p.59
 GUIZZI, L p.90
 GUMUSSOY, Cigdem Altin p.41, 64
 GUNAWAN, G. p.55
 GUO, Bin p.42
 GUO, Guilin p.56, 60
 GUO, Huairui p.84
 GUO, Jianhui p.76
 GUO, Mei p.72, 100
 GUO, Peijun p.77
 GUO, Renkuan p.57, 93
 GUO, Shin-Ming p.87
 GURUMURTHY, Anand p.61

H

H.N., Suresh p.77
 HA, Duy Long p.75
 HADDAD, Assed p.43
 HAFIZ, Abdullah Mohd. Khalid p.104
 HALIM, Siana p.98

HALIM, Tony p.91
 HÄMÄLÄINEN, Päivi p.43
 HAMMADI, S. p.73
 HAN, Gengyou p.66
 HAN, Jin p.79
 HAN, Shucheng p.65
 HANG, C C p.40, 105
 HAO, Liya p.83
 HAZRA, Jishnu p.70
 HEIMANN, Bernhard p.48
 HELANDER, Martin p.63
 HELO, Petri p.63
 HERNANDEZ, Patricio p.60
 HIDAJAT, Ubuh Buchara p.69
 HLAOITINUN, Onanong p.59
 HLAOUI BENDALY, Yousra p.80
 HO, Chengter p.77
 HO, Chin Heng p.90
 HO, Chung-Yen p.102
 HO, Pi Lan p.62
 HOOT, Nathan p.79
 HOOY, Chee Wooi p.42
 HOSSEIN MIRZAEI, Ali p.86
 HOU, Cheng-I p.101, 102
 HOU, Tung-Hsu p.96
 HSIEH, Yao-Hung p.68
 HSIN, Chia p.75
 HSU, Chia-Wei p.99
 HSU, Chun F. p.52
 HSU, Fei-Hao p.56
 HSU, Shu-Chen p.76
 HSU, Tsung-Shin p.102
 HSU, Yuanjia p.56
 HU, Allen p.99
 HU, Bei p.45
 HU, Lichen p.95
 HU, Shenping p.43
 HU, Wei p.64
 HU, Yanrong p.54
 HUANG, Chiao Tzu p.40
 HUANG, Chi-Cheng p.105
 HUANG, Ching-Jen p.55, 40
 HUANG, Chun-Jung p.73
 HUANG, Huei-Chuen p.52
 HUANG, Hui-Ling p.41
 HUANG, Jianguo p.53
 HUANG, Jincal p.104
 HUANG, Kenny p.68
 HUANG, Min p.62
 HUANG, Rong-Hwa p.101
 HUANG, Shian-Chang p.103
 HUANG, Shien-Ping p.78
 HUANG, Shih-Miao p.45
 HUANG, Szu-Chi p.101
 HUANG, Tien-Tsai p.69
 HUANG, Tzu-Jung p.105
 HUANG, Yi p.80
 HUANG, Yuyun p.60
 HUMPHREYS, Paul p.48
 HUNG, Chia-Liang p.96
 HUNG, Hsu-Feng p.52, 46
 HUYNH, Quoc Hung p.75

I

IAMRATANAKUL, Supachart p.60
 IRANMANESH, Hossein p.58, 59
 ISKANIUS, Päivi p.72
 ISLAM, Sardar p.42, 75
 ISOGAI, Rina p.62

J

JAIN, Sandeep p.46
 JAIN, Vipul p.48
 JALALI, Gholam reza p.60
 JALALI, Seyed Mohammad Javad p.90, 91
 JALILI, Monire p.59
 JANG, Seung-Cheol p.84
 JARDIM-GONCALVES, Ricardo p.94

JAVALAGI, Channappa p.65, 81
 JEMNI BENAYED, Leila p.80
 JEONG, Hwa-Young p.85
 JHENG, Yu-Du p.64
 JIA, He p.67
 JIANG, Hongxun p.84
 JIANG, Hui p.51
 JIANG, Ping p.61, 42, 87
 JIANG, Renyan p.92
 JIANG, Xiaoyue p.82
 JIAO, Roger p.63, 63, 97
 JIAO, Yuan-Yuan p.97
 JIN, Kai p.83
 JIN, Xianfei p.72
 JIN, Xiaoning p.70
 JING, Sun p.72
 JO, Jang Hyeon p.90
 JOU, Yung-Tsan p.68
 JUNG, Mooyoung p.48, 78

K

KAWEKUEKOOL, Sittichai p.44, 87
 KAJKAMHAENG, Supasit p.79
 KAKU, Ikou p.77
 KALOS, Preetam p.96
 KANAMA, Daisuke p.105
 KANG, Chao-Chung p.101
 KANG, Ruogu p.45
 KANNEGIESSER, Matthias p.99
 KANT, R. p.66
 KAO, I-Wei p.94
 KAO, Yi-Tung p.75
 KAPELUSCH, Jay p.90
 KARA, Sami p.104
 KARG, Lars p.88
 KARIM, A N Mustafizul p.104
 KATUEVA, Yaroslava p.82
 KAUT, Michal p.74
 KAYIS, A/Prof Berman p.104
 KE, Weiming p.83
 KELLY, Lori p.79
 KEMPER, Hans-Georg p.42
 KESS, Pekka p.72
 KHADIVAR, Ameneh p.90, 91
 KHAMJAN, Sakda p.70
 KHAN, Javed p.59
 KHANI, Mehdi p.91
 KHORSHIDI, Soheil p.89
 KIM, Jongseong p.86
 KIM, Jongwook p.53
 KIM, Kwanwoo p.102
 KIM, Song-Kyoo p.56
 KIMIAGARI, Salman p.59
 KIVISTO-RAHASTO, Jouni p.56
 KLEMM, Peter p.86
 KODALI, Rambabu p.61
 KOENIG, Joel p.62
 KOHLBACHER, F. p.40
 KONDO, Akio p.105
 KOO, Benjamin p.80
 KOSTAMOVAARA, Henry p.67
 KOUKI, Zoulei p.73
 KRASS, Dmitry p.91
 KSOURI, M p.73
 KULATHURAMAIYER, Narayanan p.63
 KULKARNI, Prafulla p.85
 KUMAR, Arun p.68, 97
 KUMAR, Ashok p.69
 KUMAR, Dinesh p.48
 KUMAR, Pradeep p.48
 KUMAR, Rajesh p.46
 KUO, Wei-Lun p.57
 KWON, Yongjin (James) p.85
 KYLLÖNEN, Sami p.63

L

LAEMPLAKSAKUL, Vanchai p.44, 87
 LAI, Ching-Hsiang p.51

LAI, Hong-Feng p.102
 LAI, Kin Keung p.46, 47
 LAJIS, M. Amri p.104
 LAN, Tian-Syung p.102
 LASI, Heiner p.42
 LEE, Cheol p.90
 LEE, Chun-Teh p.42
 LEE, Ho-Joong p.84
 LEE, Hsien-Da p.76
 LEE, Joahanna p.55
 LEE, Keon Myung p.66
 LEE, Kyunghuy p.48
 LEE, Moon-Kyu p.71
 LEE, Sang-Heon p.48
 LEE, Seongkon p.53
 LEMASTER, Richard p.81
 LEU, Jai-Houng p.101, 102
 LEUNG, Alvin p.43
 LEVIN, Scott p.79
 LI, Bing p.104
 LI, Bo p.95
 LI, Chunfa p.88
 LI, Haiqiu p.42
 LI, Hui-Fen p.67
 LI, J. p.44
 LI, Jia p.40
 LI, Jianfeng p.104
 LI, Jun p.42
 LI, Kun p.54
 LI, Kunpeng p.72
 LI, Li p.49, 65
 LI, Lijie p.86
 LI, Ling p.104
 LI, Xiang p.82
 LI, Xiang-dong p.42
 LI, Yanfu p.84
 LI, Yi-bo p.104
 LI, Yuxiang p.99
 LI, Zhaoshi p.77
 LI, Zhizhong p.44, 45
 LIANG, Laixin p.60
 LIANG, Liang p.65
 LIANG, Lijun p.45
 LIAO, Chi-Horng p.62
 LIAO, Li-Man p.55
 LIAO, Pen-Yuan p.103
 LIAO, Wenzhu p.75
 LIAO, Wu p.54
 LIM, Pheichin p.63
 LIM, Tae-Jin p.84
 LIM, Tek Yong p.63
 LIM, Yee Soon p.58
 LIMNARARAT, Sunpasit p.98
 LIN, Bo-Da p.95
 LIN, Chih-Chang p.51
 LIN, Ching-Torng p.42, 76
 LIN, Chin-Huang p.41
 LIN, Chin-Tsai p.54
 LIN, Hsiang-Chih p.89
 LIN, Jianjun p.95
 LIN, Peishan p.103
 LIN, Tyrone T. p.54
 LIN, Wen-Chih p.64
 LIN, Yi-Chun p.81
 LIN, Yuan Hsu p.62, 76
 LIN, Yuan-Hsu p.76
 LIN, Yu-Jing p.97
 LIN, Ziyu p.104
 LING, Yun p.43
 LIOU, Dian Yan p.41
 LIOU, Justin. D. p.41
 LIU, Bor-Shong p.45
 LIU, Changbin p.69
 LIU, Cheng-Li p.90
 LIU, Chunping p.66
 LIU, Dacheng p.70
 LIU, Fang p.75, 98
 LIU, Hongjiu p.54
 LIU, Hsiang-Chuan p.64
 LIU, Jinping p.101
 LIU, Ming p.102
 LIU, Rong p.100

LIU, Te-Hsien p.54
 LIU, Tsai-Pei p.41, 87
 LIU, Yifan p.51
 LIU, Yung Ching p.90
 LIU, Zhong p.104
 LIU, Zhongyuan p.96
 LIUM, Arnt-Gunnar p.74
 LO, Chiao-Fang p.103
 LO, Chien-Hung p.45
 LO, Chih-Chung p.46, 51
 LO, Chih-Yao p.101, 102
 LO, Mei-Chen p.54
 LONG, Kejun p.91
 LU, Chi-Jie p.78
 LU, Fuqiang p.62
 LU, Hwei-Fu p.49
 LU, Huitian p.83
 LU, Jianping p.48
 LU, Jinfu p.65
 LU, Jun p.96
 LU, Qiang p.67
 LU, Yiping p.81, 97
 LUH, Yuan-Ping p.97
 LUOMA, Eetu p.66
 LUONG, Lee p.48, 71
 LUR, Yung-Yih p.50

M

M. KHALID, Halimahtun p.63
 MA, Daw p.61
 MA, Lin p.82, 92
 MA, Rufe p.60
 MA, Xiaohe p.104
 MA, Yi-zhong p.82
 MACCARTHY, Bart p.46, 47
 MACDONALD, Alasdair p.79
 MAGUIRE, Liam p.48
 MAHADEVAN, B p.70
 MAHDAVI, Mohamad p.80
 MAHDAVI, Mojtaba p.80
 MAHDIANI KHOTBESARA, Rahman p.87
 MAHMOODZADEH, Soheil p.73, 88
 MAKUL, Ahmad p.60, 86
 MANZONI, Alex p.42
 MARASHI, Emad p.79
 MARAVELAKIS, Petros p.57
 MARIAN, Romeo p.71
 MARX, Roberto p.44
 MASAROTTO, Guido p.57
 MASRUROH, Nur Aini p.78
 MATHEW, Joseph p.82, 92
 MATSUI, M. p.72
 MATT, Dominik T p.87
 MAZHELIS, Oleksiy p.53
 MCIVOR, Ronan p.48
 MEHDIZADEH, Esmaeil p.46
 MEILER, Markus p.99
 MEJÍA-GUTIÉRREZ, Ricardo p.66
 MELISSA, p.98
 MENEZES, Mozart p.91
 MENG, Jingjuan p.97
 MENG, Xiaojun p.95
 MESGARI MASHHADI, Mostafa p.75
 MESGARI MASHHADI, Mostafa p.55
 MESSENI PETRUZZELLI, Antonio p.72
 MICHNIK, Jerzy p.54
 MILI, Aymen p.84
 MILOSEVIC, Dragan p.60
 MOGI, Gento p.53
 MOHAPATRA, Asit p.62
 MOIN, Noor Hasnah p.72
 MOJIBI, Toraj p.89
 MOJIR, Navid p.59
 MOORE, J. Steven p.90
 MORABBI, Arash p.71, 92
 MORAVVEJI, Sayed Sajjad p.94
 MOVARREI, Reza p.72
 MUJAHID, Syed p.83
 MUKHERJEE, Indrajit p.51

MÜLLER-SEITZ, Gordon p.69
 MUN, Jungtae p.48, 78
 MUYLDERMANS, Luc p.46, 47

N

N, Rajeev p.98
 NADIMI, Reza p.50, 75
 NAGAI, Hiromasa p.81
 NAKAGAWA, Toshio p.93
 NAKAMURA, Syouji p.93
 NAKHAI KAMALABADI, Isa p.86
 NANDURKAR, Keshav p.96
 NARASIMALU, Srikanth p.105
 NASRI, Azam p.82
 NAVALE, L. G. p.96
 NAZABADI, Mohammad Reza p.81
 NAZAROV, Dmitry p.82
 NENONEN, Sanna p.56
 NEUBERT, Gilles p.41
 NEZAFTI, Navid p.90
 NG, Adam T.S. p.78
 NG, Kien Ming p.74
 NGUYEN, Hoang Linh p.77
 NI, Cheng p.63
 NIELSEN, Sven Hvid p.89
 NING, Ruxin p.95
 NIU, Jia p.60, 77
 NOLTING, Michael p.69
 NYHUIS, Peter p.53, 78

O

OEHMEN, Josef p.61, 47, 88
 OJANEN, Ville p.68
 ONG, Hoon Liong p.74
 ONG, Kein Wei p.105
 ONO, Shuichiro p.95
 ONUMA, Masaru p.81
 ORTIZ, Albert p.93
 OUZROUT, Yacine p.41

P

PAI, Ping-Feng p.100
 PAN, Chih-Chin p.97
 PAN, Chong p.82
 PAN, Ershun p.75
 PAN, Rong p.84
 PANAH, Hadi p.91
 PARIAZAR, Mahmood p.73
 PARIAZAR, Mahmood p.71, 88, 92
 PARK, Young C. p.49
 PATHUMNAKUL, Supachai p.70
 PENG, Hong p.63
 PENG, Jisheng p.65
 PENG, Peng p.45
 PENG, Xinmin p.56, 42, 64
 PENG, Yunfang p.78
 PHARSIYAWAR, Shreeshail p.65
 PICHITLAMKEN, Juta p.79
 PIEWTHONGNGAM, Kullapapruk p.70, 103
 PILKINGTON, Alan p.66
 PILLET, M. p.90
 PIRI, Fatemeh p.51
 PIRMORADI, Zhila p.59
 PIRNAZAR, Nasim p.50
 POH, Kim Leng p.53, 78
 PRALUS, M. p.90
 PRETORIUS, Leon p.79, 87
 PRETORIUS, Tinus p.40
 PROBERT, David p.41
 PUANGDOWNREONG, Deacha p.98
 PURANIK, Vinod p.84

Q

QI, Jing-yu p.66
QIAN, Yan-Jun p.60
QIAN, Yin p.88
QIN, Guanhua p.92
QIN, Hua p.44
QIN, Xiansheng p.53, 54
QURESHI, M.N. p.48
QURESHI, Zahid p.43, 48

R

R, SudhakaraPandian p.85
RABBANI, Masoud p.72
RACHAVONG, C. p.87
RAHMAN, Anisur p.49
RAJ, Piyush p.78
RAJABZADEH, Ali p.91
RAMDASS, Kem p.87
RAU, P.L. Patrick p.44, 45
RAVANSHADNIA, Mehdi p.58
RAY, Amitava p.52
RAY, Pradip Kumar p.51
RAY, Thomas p.82
RAZA, Syed Asif p.58
REAL, Romain p.90
REDDY, Venkatarami p.92
REGER, Guido p.69
REN, Cuirong p.83
REN, Jie p.40
REN, Jin-chan p.85
REN, Li-cheng p.69
RIZWAN, Syed p.84
ROONEY, Alex C p.79

S

S, Saravanasankar p.85
S S, Mohapatra p.85
SADEGHI KEYNO, Hamid Reza p.101
SAGEBIEL, Hanno p.99
SAHPUTRA, Iwan Halim p.96
SAITO, Harumi p.45
SALAM, Adil p.58
SALAMAT, Wahid p.55
SALMAN, Sibel p.75
SALMI, Pekka p.68
SALONI, Daniel p.81
SALVENDY, Gavriel p.45
SANCAK, Emre p.75
SAN-JOSÉ, Luis-Augusto p.101
SANYAL, Subir p.52
SARHADI, Hassan p.74
SARKAR, Bijan p.52
SARMAH, Sarada Prasad p.70
SATO, Hitomi p.45
SAWADA, Kiyoshi p.50
SCHMIDT, Matthias p.78
SCHULTZ, Christian p.69
SCHWINDT, Christoph p.99
SEPPÄNEN, Marko p.67
SHA, D.Y. p.47
SHA, Quanyou p.54
SHAFIA, Mohammad Ali p.101
SHAHID, Muhammad Khalil p.40, 103
SHAHRABI, Jamal p.73, 71, 92
SHAKOURI G., Hamed p.50, 75
SHAMSUZZAMAN, Mohammad p.57
SHANKER, Kripa p.85
SHAO, Xinyu p.78
SHARIAT MOHAYMANY, Afshin p.50
SHARMA, Monica p.61
SHARMA, R R K p.74
SHE, Cheung-Wo p.95
SHEN, Chun-Ying p.97
SHEN, Songhua p.104
SHI, Guicheng p.67
SHIM, Sung p.68
SHIN, Hyun Joon p.71

SHIN, Moonsoo p.48, 78
SHIN, Sungchul p.53
SHOJI, Keisuke p.81
SHOU, Yongyi p.60
SHU, Tong p.46, 47
SHUAL, Jia-Jane p.103
SIADAT, Ali p.84
SICILIA-RODRIGUEZ, Joaquin p.101
SIMONETTI, Paulo Eduardo p.44
SINGH, M.D p.66
SINGH, Vikram p.69
SINHA, Santanu p.70
SIRIRAM, Rajenlall(Raj) p.68
SIVALINGA G, Ponnambalam p.85
SONG, Haiqing p.52, 48
SONG, Joobong p.90
SONG, Young Jae p.85
SONG, Yu p.95
SONNTAG, Michel p.62
SOON, Wan Mei p.73
SRIVASTAVA, Rajiv p.78
STAFFORD, Edward p.75
SU, Chi-Hung p.96
SU, Hui-yong p.60, 77
SU, Jian-Wei p.97
SU, Yea-Huey p.96
SU, Yi- Fen p.103
SU, Zheng p.51
SUH, Won Yong p.90
SUKSAWAT, Jakrapan p.103
SULIMAN, Saad M. A. p.93
SUMITA, Ushio p.62
SUN, C. H. p.95
SUN, Houfang p.86
SUN, Jianguang p.64, 73
SUN, Jung-Wei p.97
SUN, Wenxiang p.65
SUN, Yong p.82, 92
SUN, Yuan p.56, 60, 42
SUREEPHONG, Pradorn p.41
SUSANTY, Aries p.69
SUWANNARONGSRI, Supaporn p.98

T

T.T., Narendran p.51
TABARI, Mojtaba p.89
TAKEDA, Takashi p.95
TAMMINENI, Satish p.81
TAN, Hui boon p.42
TAN, Kay Chuan p.67
TAN, Runhua p.61, 42, 64, 73, 75, 87, 98
TANG, Jia-Da p.95
TANG, Lei p.46
TANG, Loon Ching p.91
TANG, Mei Ying p.105
TANG, Shoulian p.40, 103
TANG, Wei p.100
TANG, Ying p.71, 88
TANG, Zhongjun p.98
TANUGUR, Ayse Gonul p.87
TAO, Yan p.69
TAO, Yu-Hui p.55
TAVAGHOF GIGLOO, Dariush p.101
TAVAKKOLI-MOGHADDAM, Reza p.46, 72, 98, 91
TAVANA, Madjid p.79
TAVARES, Jose p.61
TENGLOLAI, Arunwadee p.103
THIA, C. p.98
THOUTOU, Sayi p.57
TIAN, Changdong p.45
TIAN, Qing p.48
TING, Ching-Jung p.71
TIPPAYAWANNAKORN, Noocharin p.79
TOCKENBÜRGER, Lüder p.41
TOFIGHI, Maryam p.55
TONG, Shurong p.53, 54, 95, 100
TORKAMANI, Mohammad Ali p.88
TORKKELI, Marko p.68
TOURASSIS, Vassilios p.83, 78

TRAUTMANN, Norbert p.99
TSAI, Chi-Yang p.94
TSAI, Kune-muh p.47
TSENG, Bill p.85
TSENG, Fan p.75
TSENG, Fan-Chen p.88, 94
TSENG, Ming-Lang p.62, 76
TSENG, Mitchell p.97
TU, F. S. p.71
TYAN, Leewen p.103
TYRVÄINEN, Pasi p.53, 66

U

UANG, Shiaw-Tsyrr p.90
UTHAYOPAS, Putchong p.79

V

VANNMAN, Kerstin p.57
VEDADI, Ahmad p.50
VENKATESWARAN, Jayendran p.81
VERMA, Priyanka p.74
VESSAL, Sara p.72
VIITALA, Erkki p.53

W

WALLACE, Stein W. p.74
WANG, Baihe p.53
WANG, Cheng-Tzu p.51
WANG, Chih-Hsuan p.96
WANG, Dan p.103
WANG, GuoXin p.81
WANG, Haiying p.70
WANG, Hongbo p.69
WANG, Hsiao-Fan p.56, 73, 91
WANG, Jian-Jun p.67
WANG, Jing p.99
WANG, Kai p.56
WANG, Kanliang p.69
WANG, Keqin p.95
WANG, L. p.44
WANG, Lingyun p.72
WANG, Liying p.44, 65
WANG, Miaoling p.54
WANG, Min p.93
WANG, Qiang p.70
WANG, Shidong p.51
WANG, Shouyang p.46, 47
WANG, Tien-Chin p.76
WANG, Wei-Ling p.40
WANG, Wendan p.53, 54
WANG, Wen-Pai p.102
WANG, Xiaoyun p.61
WANG, Xingwei p.62
WANG, Xiujiang p.65
WANG, Xueqing p.101
WANG, Xun p.99
WANG, Xun p.43
WANG, Yi-Chen p.94
WANG, YinChai p.63
WANG, Ying p.45
WANG, Yong p.104
WANG, Yonggui p.67
WANG, Yue p.97
WANGPHANICH, Pilada p.104
WATANABE, Chihiro p.68
WEE, Hui-Ming p.68
WEI, Chun-Chin p.103
WEI, Jinyu p.52
WEI, Meng-Ying p.51
WEI, Wan-Ru p.100
WEN, Ching-Feng p.50
WEN, Peihan p.94
WENG, Wei-Sheng p.64
WENG, Yi-fei p.100
WESSELS, Arie p.79
WONG, Dominic p.51

WRIGGERS, Felix p.53
 WRIGHT, Robert p.79
 WU, Cheng-Ting p.56
 WU, Chuan-Chun p.100
 WU, Cui-hua p.69, 66
 WU, Der-bang p.64
 WU, Hsiao-Chung p.66
 WU, Hsien-Jung p.95
 WU, Hsin-Hung p.103
 WU, Kuang-Yao p.102
 WU, Kun-Chih p.71
 WU, Li-Ming p.50
 WU, Ming-Ta p.89
 WU, Qiang p.62, 65
 WU, Su p.44, 45
 WU, Szu-Hui p.55
 WU, Xuejing p.62
 WU, Yan-Kuen p.51
 WU, Yu-Lung p.55, 100
 WU, Zhang p.57

X

XI, Lifeng p.83, 84, 75
 XIANG, Yiming p.43
 XIAO, Jian p.80
 XIAO, Ruliang p.104
 XIE, Min p.57, 84
 XIU, Baoxin p.104
 XU, Chunhui p.77
 XU, Dongsheng p.71
 XU, Jiuping p.52, 52
 XU, Minghui p.70
 XU, Qian p.86
 XU, Qianli p.63
 XU, Song p.44, 45
 XU, Xianlong p.100
 XU, Yongzhong p.44
 XU, Zeshui p.
 XUE, Yao-wen p.66

Y

Y C WANG, William p.48
 YAN, Guoqing p.64
 YAN, Wen-zhou p.60, 77
 YAN, Xiutian p.53, 54
 YAN, Yan p.81, 95
 YAN, Zhenhua p.53
 YANG, Bo p.82
 YANG, Bojun p.42, 87
 YANG, Chang-Lin p.102, 101
 YANG, Chyan p.55, 103
 YANG, De-Li p.67
 YANG, Ho-Li p.41
 YANG, Jian Mei p.64
 YANG, Jun p.83
 YANG, Pei-Chi p.55, 100
 YANG, Wen-Wei p.51
 YANG, Xi p.63, 63
 YANG, Xiaoguang p.91
 YANG, Xiaoling p.78
 YANG, Yongyan p.84
 YANO, Hitoshi p.54
 YAO, Zhong p.67
 YE, Heng Qing p.73
 YEH, Cheng Tah p.81
 YEN, Eric p.68
 YILDIRIM, Elif p.75
 YOON, Chui Young p.66
 YU, Gang p.101
 YU, Hong-Lei p.67
 YU, Jian-Bo p.84
 YU, Jiang p.61
 YU, Min p.86
 YUM, Bong-Jin p.102
 YUN, Myung Hwan p.90

Z

ZAERI, Mohammad Saeed p.73, 71, 88, 92
 ZAERPOUR, Nima p.72
 ZAHARA, Erwie p.75
 ZEINAL HAMADANI, Ali p.82
 ZENG, Liang p.45
 ZENG, Xin p.70
 ZHANG, Haiyun p.57
 ZHANG, Huangao p.42, 64
 ZHANG, Jianhui p.64, 73
 ZHANG, Jingbo p.69
 ZHANG, Peng p.75, 98
 ZHANG, Ruihong p.81
 ZHANG, Sen-yue p.104
 ZHANG, Sheng-lu p.48
 ZHANG, Wei p.45
 ZHANG, Weimin p.86
 ZHANG, Weiming p.104
 ZHANG, Xian Guo p.64
 ZHANG, Xiang p.49, 65
 ZHANG, Xiao p.40
 ZHANG, Xu p.95
 ZHANG, Yijing p.44
 ZHANG, Ying p.56
 ZHANG, Ying p.86
 ZHANG, Yong-yun p.69
 ZHANG, Yuan p.52
 ZHANG, Zhaoguo p.88
 ZHANG, Zhihai p.51
 ZHAO, Bo p.95
 ZHAO, Butong p.65
 ZHAO, Haiyan p.80
 ZHAO, Hui p.101
 ZHAO, Lihui p.52
 ZHAO, Lindu p.46, 102, 103
 ZHAO, Lingxuan p.61, 87
 ZHAO, Qianyi p.44
 ZHAO, Weilin p.68
 ZHAO, Wenyan p.42
 ZHAO, XiuLi p.72, 100
 ZHAO, Xiuping p.87
 ZHAO, Yingshuai p.97
 ZHAO, Yuan p.103
 ZHENG, Jianlong p.91
 ZHENG, Li p.51, 80, 94
 ZHONG, Hao-qin p.44
 ZHOU, Chuan p.79
 ZHOU, Jian p.94
 ZHOU, Juan p.65
 ZHOU, Ling p.48
 ZHOU, Lixin p.44
 ZHOU, Peng p.53
 ZHOU, Ronggang p.45
 ZHOU, Weihua p.71, 88
 ZHOU, Xiao-hong p.60
 ZHOU, Yingbo p.42, 64
 ZHU, Fangwen p.56
 ZHU, Huiming p.83
 ZHU, JinFu p.72, 100
 ZHU, Zhecheng p.74
 ZHUANG, Pin p.103