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**8 to 11 December, Hong Kong**

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

Organised by:

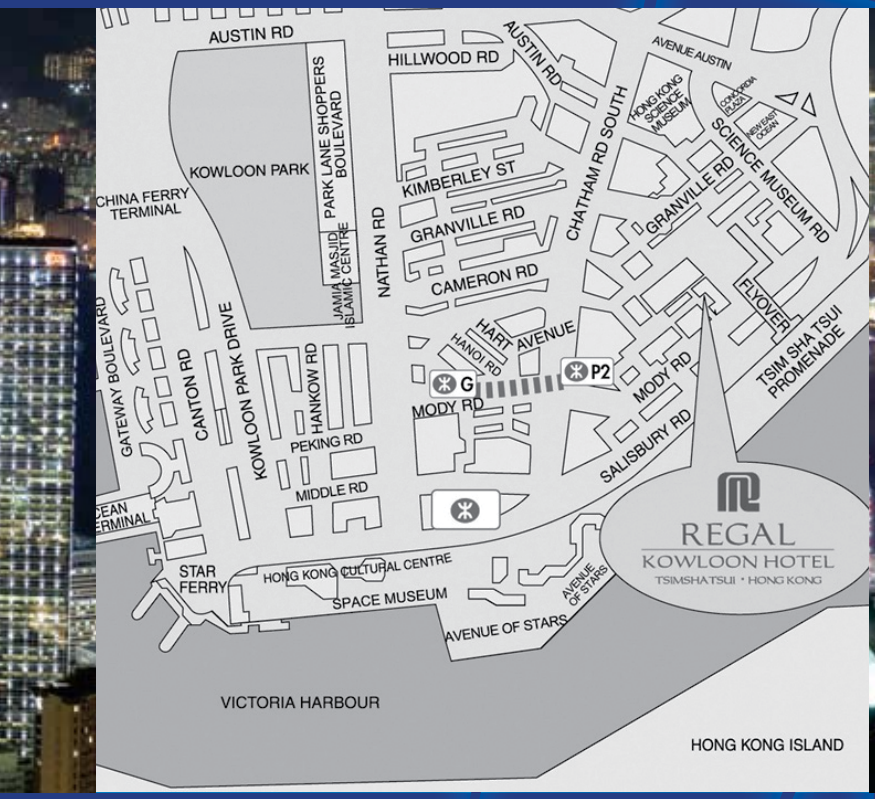
IEEE Technology Management Council
Singapore Chapter

IEEE Singapore Section

IEEE Technology Management Council
Hong Kong Chapter

# Contents



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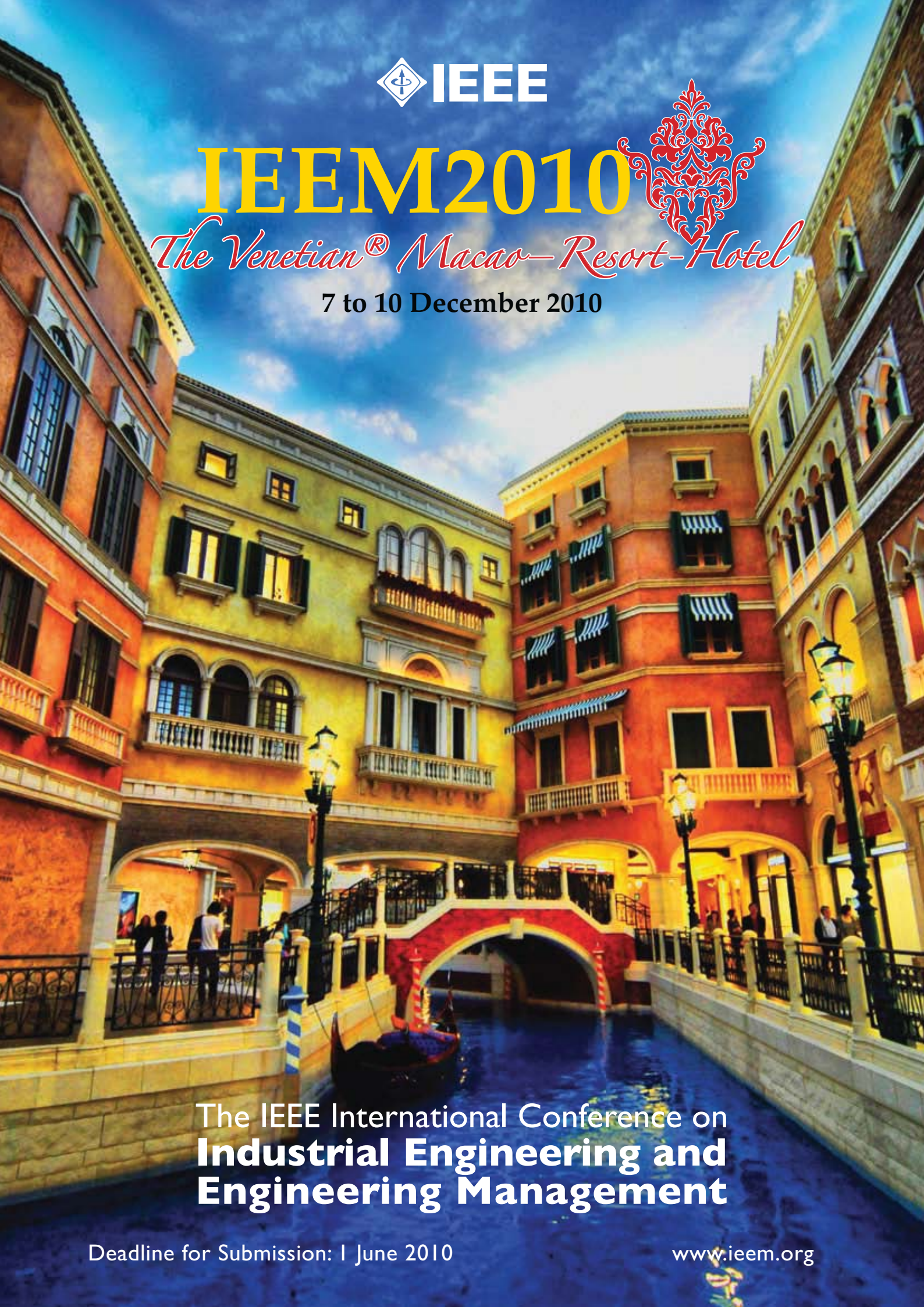
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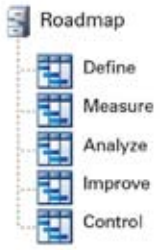


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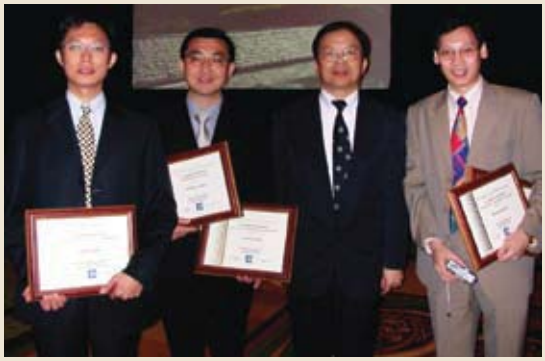



**Research in IELM falls along two themes:** Logistics and Supply Chain Management, and Product Design and Manufacturing. Within these focuses, we investigate a range of subjects encompassing Logistics and Supply Chain Management, Service and Quality Management, Product Design and Development, Human Factors and Ergonomics, and Advanced Manufacturing Systems. The Department has a host of state-of-the-art facilities to support our research. Government and industry funded projects are on-going. Collaborations with renowned universities and professional institutions have also been established.





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香港城市大學
City University of Hong Kong

製造工程及工程管理學系
Department of Manufacturing Engineering and Engineering Management

In addition to other engineering programmes, MEEM offers a full suite of IEEM programmes from **BEng** to **EngD**.

### Bachelor of Engineering (Hons) in Industrial Engineering and Engineering Management (BEIEEM)

This programme aims to equip students with problem solving, technical and managerial skills and knowledge related to Industrial Engineering and Engineering Management and to prepare them for professional careers in managing manufacturing, engineering and other technology oriented services.

The graduates will develop:

* a broad understanding of the principles and technologies related to engineering and manufacturing;
* the ability to conceptualize, analyze, synthesize and implement industrial systems and services; and
* the ability to efficiently manage manufacturing, engineering and other technology oriented systems.

### Master of Science in Engineering Management (MSEM)

The programme is designed for engineers with the aim to meet the education needs of practising engineering managers by developing their managerial skills, specialist expertise and functional capability in the context of Engineering Management.

The uniqueness of the programme as compared with other management programmes lies in the following:

**Engineering Management Context**
While the management skills are common, the engineering managers manage activities with a strong engineering / technical content. This programme provides the strong engineering management context.

**Functional Needs of Engineering Management**
The functions of general and engineering managers are significantly different. General managers are oriented towards business issues. Engineering managers undertake professional functions such as engineering project management, engineering operations planning and control and product / services development. This programme aims to develop a critical understanding of the academic and professional knowledge required in the execution of these engineering management functions.

**Empathy**
Engineers have special strengths and weaknesses. This programme focuses on the characteristics of engineers as a group. This facilitates the concentration and empathy required for the successful transition from the role of engineers to that of engineering managers.

### Engineering Doctorate (EngD)

The Engineering Doctorate is a professional doctorate degree. The Engineering Doctorate program at MEEM of CityU focuses on Engineering Management. It is a part-time programme designed for senior managers and engineers in all sorts of Hong Kong / China organizations. The programme aims at developing the candidates' creative thinking and overall capability to apply innovative technologies and advanced management methods to meet the long-term strategic needs of their organizations.

The EngD programme was launched in 2000 and has attracted more than 80 senior engineering managers and executives from engineering companies, educational institutes and governmental organizations in Hong Kong / China, leading to a widening network for engineering management, technological innovation, entrepreneurship and industry-university collaboration.

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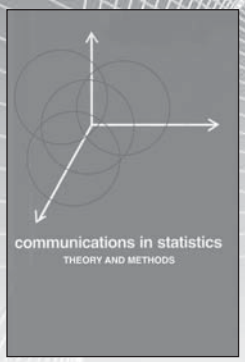


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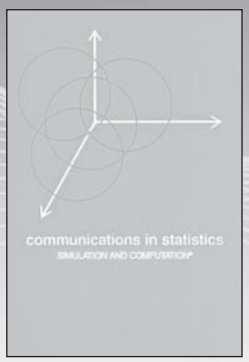


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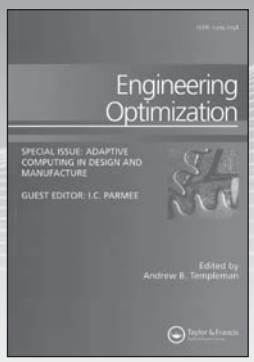


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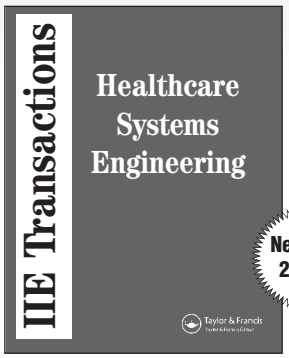


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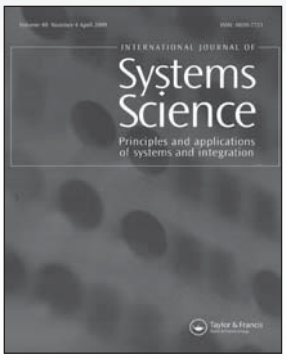


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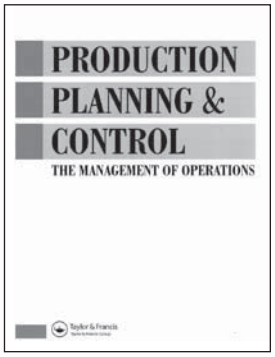


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City University of Hong Kong,
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**Roger Jiao,**
Program Chair,
School of Mechanical Engineering,
Georgia Institute of Technology,
USA

# Welcome Message
## by Conference Chairs

**It is our great pleasure to welcome you to the 2009 IEEE International Conference on Industrial Engineering and Engineering Management, in Hong Kong. This conference series, started by the Singapore Chapter of IEEE Technology Management Council (formerly known as Engineering Management Society), is organised in collaboration with IEEE Technology Management Council Hong Kong Chapter this time.**

The conference has attracted close to 1,500 submissions this year. As usual, we had a rigorous review process to maintain a high standard. The 500 papers appearing in the proceedings is a collection of the best accepted after this review. Each paper was sent to 3-4 reviewers, comprising the technical programme committee members and some author-reviewers. The organising committee would like to thank all the authors for their contribution and all the reviewers for their effort in completing the review within the stipulated time.

In addition to the support from National University of Singapore and Nanyang Technological University, we have the City University of Hong Kong and Hong Kong University of Science and Technology as co-organisers of IEEM2009. IEEE Technology Management Council Hong Kong Chapter is the main local host for this event. The organising committee is grateful for their contribution and support to make this conference a success.

IEEM conference has been an international event. At every conference, we have participants representing 40-50 countries/ regions. This year is no difference. We wish all participants a pleasant stay in Hong Kong and would like to take this opportunity to extend our invitation to you for another IEEM in the future.

**Way Kuo**
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**Hongyi Sun**
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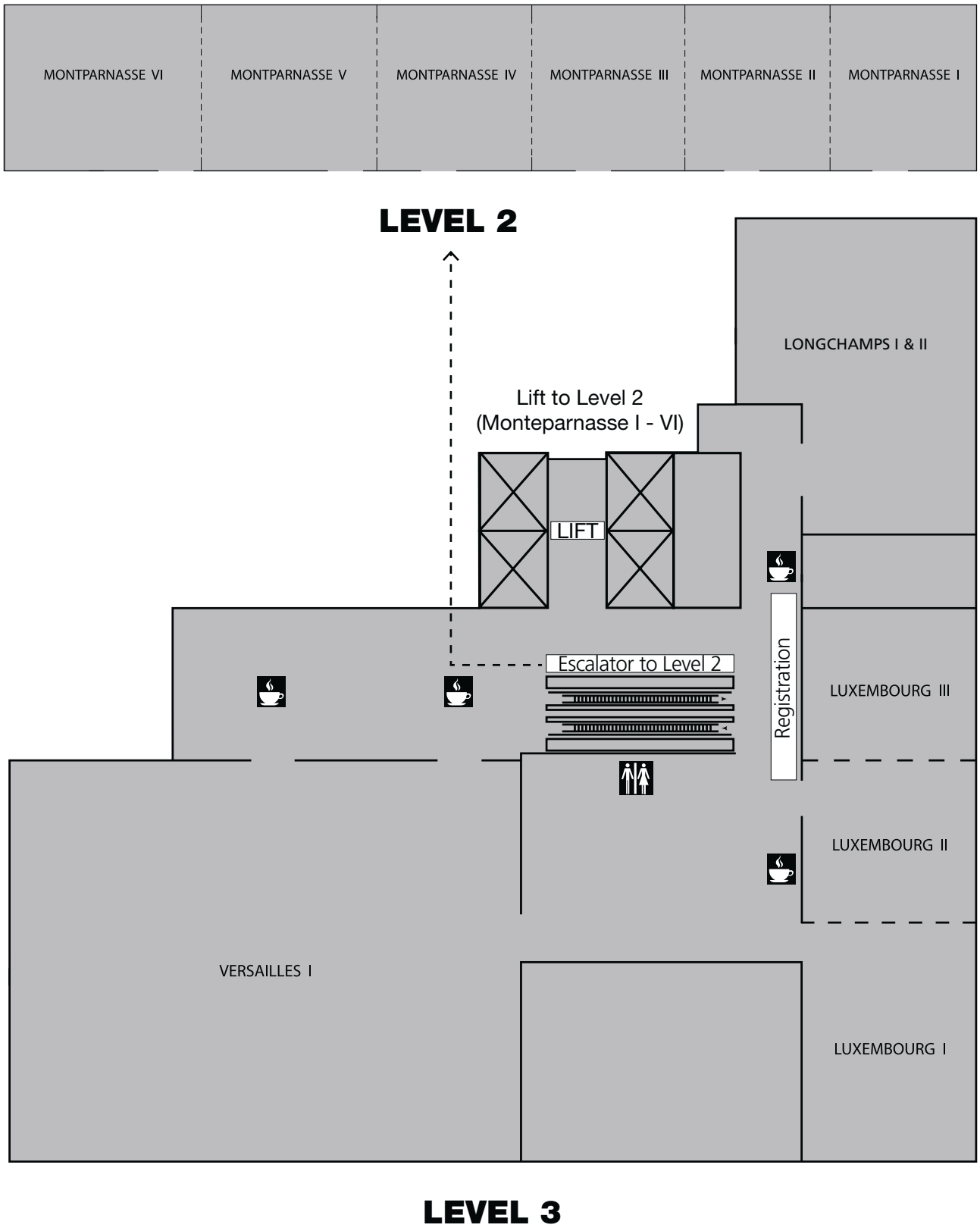
# Meeting Rooms - Floor Plan



# Program Overview

| TIME & DATE | | Meeting Rooms and Sessions | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Luxembourg I | Luxembourg II | Luxembourg III | Montparnasse I | Montparnasse II | Montparnasse III | Montparnasse IV | Montparnasse V | Longchamps I & II |
| DAY 0<br>8 DEC 09 TUESDAY | 13.30 | | | | | Registration Desk Opens<br>Guided Tours | | | | |
| | 16.00 - 18.00 | | | | | Registration (Cont'd)<br>Welcome Reception | | | | |
| DAY 1<br>9 DEC 09 WEDNESDAY | 9.00 - 10.30 | Level 3 Versailles Room - Opening, Keynote Presentations I & II p. 13 & 14 | | | | | | | | |
| | 11.00 - 12.30 | Technology & Knowledge Management 1 p. 18 | Manufacturing Systems 1 p. 19 | Reliability & Maintenance Engineering 1 p. 20 | Operations Research 1 p. 21 | Quality Control & Management 1 p. 22 | Supply Chain Management 1 p. 23 | Project Management 1 p. 24 | Intelligent Systems 1 p.25 | 15.00 to 15.30 Poster Session 1 p. 26 & 27 |
| | 12.30 - 13.30 | Lunch Buffet | | | | | | | | |
| | 13.30 - 15.00 | Technology & Knowledge Management 2 p. 18 | Manufacturing Systems 2 p. 19 | Reliability & Maintenance Engineering 2 p. 20 | Operations Research 2 p. 21 | Quality Control & Management 2 p. 22 | Supply Chain Management 2 p. 23 | Project Management 2 p. 24 | Intelligent Systems 2 p. 25 | |
| | 15.30 - 17.00 | Technology & Knowledge Management 3 p. 18 | Manufacturing Systems 3 p. 19 | Reliability & Maintenance Engineering 3 p. 20 | Operations Research 3 p. 21 | Quality Control & Management 3 p. 22 | Supply Chain Management 3 p. 23 | Project Management 3 p. 24 | Decision Analysis & Methods 1 p. 25 | |
| DAY 2<br>10 DEC 09 THURSDAY | 9.00 - 10.30 | Level 3 Versailles Room - Keynote Presentation III & Meet-the-Editor Panel p. 15 & 16 | | | | | | | | |
| | 11.00 - 12.30 | Technology & Knowledge Management 4 p. 28 | Production Planning & Control 1 p. 29 | Reliability & Maintenance Engineering 4 p. 30 | Operations Research 4 p. 31 | Quality Control & Management 4 p. 32 | Supply Chain Management 4 p. 33 | Project Management 4 p. 34 | Decision Analysis & Methods 2 p.35 | 15.00 to 15.30 Poster Session 2 p. 36 & 37 |
| | 12.30 - 13.30 | Lunch Buffet | | | | | | | | |
| | 13.30 - 15.00 | Technology & Knowledge Management 5 p. 28 | Production Planning & Control 2 p. 29 | Global Manufacturing & Management 1 p. 30 | Service Innovation & Management 1 p. 31 | Quality Control & Management 5 p. 32 | Supply Chain Management 5 p. 33 | Information Processing & Engineering 1 p. 34 | Decision Analysis & Methods 3 p. 35 | |
| | 15.30 - 17.00 | Technology & Knowledge Management 6 p. 28 | Production Planning & Control 3 p. 29 | Global Manufacturing & Management 2 p. 30 | Service Innovation & Management 2 p. 31 | Engineering Economy & Cost Analysis 1 p. 32 | Supply Chain Management 6 p. 33 | Information Processing & Engineering 2 p. 34 | Decision Analysis & Methods 4 p. 35 | |
| | 18.00 - 22.00 | Conference Banquet - Victoria Harbour Dinner Cruise on the Bauhinia p. 12 | | | | | | | | |
| DAY 3<br>11 DEC 09 FRIDAY | 9.00 - 10.30 | Technology & Knowledge Management 7 p. 38 | Production Planning & Control 4 p. 38 | Facilities Planning & Management 1 p. 39 | Human Factors 1 p. 40 | Systems Modeling & Simulation 1 p. 40 | Safety, Security & Risk Management 1 p. 41 | E-Business & E-Commerce 1 p. 42 | Decision Analysis & Methods 5 p. 42 | 10.30 to 11.00 Poster Session 3 p. 44 & 45 |
| | 11.00 - 12.30 | Technology & Knowledge Management 8 p. 38 | Production Planning & Control 5 p. 39 | Engineering Education & Training 1 p. 39 | Human Factors 2 p. 40 | Systems Modeling & Simulation 2 p. 41 | Safety, Security & Risk Management 2 p. 41 | E-Business & E-Commerce 2 p. 42 | Decision Analysis & Methods 6 p. 43 | |
| | 12.30 - 13.30 | Farewell Lunch | | | | | | | | |
| | 14.00 - 16.30 | Guided Tour | | | | | | | | |

*Meal Venues - See page 12*

# Conference Highlights

**8 Dec – Tue: Delegate Arrival, Registration, Welcome Reception & Guided Tours**

| | | |
|---|---|---|
| 1.30pm | Registration Desk Opens | Level 2 Montparnasse Room |
| 2.30pm | Repulse Bay / The Peak Tour | Meet at Level 1 Lobby |
| 4.00 to 6.00pm | Registration & Welcome Reception | Level 2 Montparnasse Room |

**Guided Tour** (Please Present Ticket Before You Board The Coach)

- Repulse Bay / The Peak Tour (Includes Dinner) Coach Departs Hotel 2.30pm and Returns 8.30pm

**9 Dec – Wed To 11 Dec – Fri**
**Poster Sessions, Daily Coffee/Tea & Lunch**

| | | |
|---|---|---|
| 10.30 to 11.00 – AM Break | 3.00 to 3.30 – PM Break | Level 2&3 Meeting Room Foyers |
| 10.30 to 11.00 – AM Poster | 3.00 to 3.30 – PM Poster | Level 3 Longchamps Room |
| 12.30 to 1.30pm | Lunch Buffet | Level 3 Versailles Room |

**9 Dec – Wed: Opening, Keynote Presentations & Concurrent Sessions**

| | | |
|---|---|---|
| 8.00 to 8.45am | Registration Desk Opens | Level 3 Foyer |
| 8.50 am | Guests & Delegates to be seated | Level 3 Versailles Room |
| 9.00 to 9.45am | Opening & Keynote I p. 13 | Level 3 Versailles Room |
| 9.45 to 10.30am | Keynote II p. 14 | Level 3 Versailles Room |

**10 Dec – Thu: Keynote Presentations & Concurrent Sessions**

| | | |
|---|---|---|
| 8.00 to 8.45am | Registration Desk Opens | Level 3 Foyer |
| 8.50am | Guests & Delegates to be seated | Level 3 Versailles Room |
| 9.00 to 9.45am | Keynote III p. 15 | Level 3 Versailles Room |
| 9.45 to 10.30am | Meet-the-Editor Panel p. 16 | Level 3 Versailles Room |

**IEEM2009 Conference Dinner – Cruise Dinner**
(Please Present Dinner Ticket Before You Board The Coach)

- Coach departs Regal Kowloon from 5.30pm. Last Bus leaves by 5.45pm
- Function starts 6.30pm
- Coach departs dinner venue from 9.30pm and arrives Regal Kowloon by 10.30pm

**11 Dec – Fri: Concurrent Sessions**

| | | |
|---|---|---|
| 8.30 to 11.30am | Registration Desk Opens | Level 3 Versailles Room |
| 2.00pm | Guided Tour | Meet at Hotel Lobby |

**Guided Tour** (Please Present Ticket To Coach Driver)

Science & Technology Park Tour Coach Departs Hotel 2.00pm and Returns 4.30pm

**Wed – 9 Dec, 9.00 to 9.45am**

# A Theory of Innovation


## Nam-pyo Suh

*President,*
*Korea Advanced Institute of Science & Technology (KAIST)*



**Abstract**

It is generally agreed that innovation refers to the process of converting research results, ideas, inventions or scientific discoveries into commercially successful products, processes, services or systems. The rates of innovation differ a great deal among nations and even between regions within a nation. Are there some basic principles that a nation or a region must satisfy to promote innovation? In this presentation, three laws of innovation are presented as the necessary conditions for creating innovations hubs and innovations. This theoretical framework may be used in formulating government policies for economic growth and innovation.


**About the Keynote Speaker**

Dr. Nam Pyo Suh is the President of the Korea Advanced Institute of Science and Technology (KAIST). He assumed this position on July 13, 2006.

Since his inauguration, Dr. Suh has made the goal of making KAIST one of the best research universities in the world, already making tremendous changes acclaimed by many.

Previously, he had been at MIT since 1970, where he was the Ralph E. & Eloise F. Cross Professor, a member of the Engineering Council of MIT (1980-1984 and 1991-2001), and the head of central laboratories, centers and the department of Mechanical Engineering.

In October 1984, Professor Suh took a leave of absence from MIT to accept a Presidential Appointment by President Ronald Reagan to the National Science Foundation where he was in charge of engineering. During his tenure at NSF, he created a new direction for the Engineering Directorate and introduced a new organizational program designed "to ensure that the United States will occupy a leadership position in engineering well into the 21st century."

Many awards and honors has be given to celebrate his accomplishments and dedication including seven honorary doctoral degrees, the Federal (NSF) Engineer of the Year Award from NSPE with the ASME medal to be given in November, 2009.

Professor Suh was educated at Buckingham, Browne and Nichols School (1955), MIT (S.B., 1959, and S.M., 1961) and Carnegie-Mellon University (Ph.D., 1964), and he is married to Young J. Suh (née Surh). They have four daughters, four sons-in-law, and six grandchildren.

# Keynote Presentations

**Wed – 9 Dec, 9.45 to 10.30am**

## Sustainable Development – New Challenges for Industrial Engineers in the 21st Century


### Wai Kwok Lo

*Deputy Chairman and Managing Director,*
*Surface Mount Technology (Holdings) Ltd*



**Abstract**

In the past century, the focus of engineers was largely on development through technological progress, with main objectives of speeding up the extraction of natural resources and to shape the environment to support the demands of an ever-increasing population. Now, we can almost count the days that remain before all of our natural resources are exhausted. We are facing many problems such as pollution and global warming that will affect the quality of our lives and the welfare of our future generations. All these issues imply new challenges to industrial engineers who must now design, develop and implement integrated systems to make use of various resources in sustainable ways.


**About the Keynote Speaker**

**Ir Dr LO Wai Kwok, BBS, MH, JP**
**BSc(Eng) MSc(Eng) MBA EngD CEng FHKIE FIET FIMechE RPE**

Ir Dr Lo Wai Kwok is Deputy Chairman and Managing Director of Surface Mount Technology (Holdings) Ltd., a well-known Hong Kong electronics manufacturing service provider listed in the Singapore stock market. Through its strong manufacturing network in the key economic zones in China mainland, the company supports leading customers in the world automotive, computer, display, communications, industrial electronics and consumer electronics markets.

Ir Dr Lo is an experienced and seasoned industrialist and community leader in Hong Kong. He was President of the Hong Kong Institution of Engineers for the session 2007-2008. He is currently Member of the Shatin District Council, Deputy Chairman of the Hong Kong Quality Assurance Agency, Member of the Council for Sustainable Development, and President of Guangdong-Hong Kong Association for the Promotion of Technology Enterprise, Chairman of the Engineering Disciplines Advisory Board of the Vocation Training Council, and Chairman of the Departmental Advisory Committee of the MEEM Department of the City University of Hong Kong. He is Adjunct Professor of the City University of Hong Kong and Guest Professor of the University of Electronic Science and Technology Zhongshan College. He is Industrial Fellow of the Warwick University, Honorary Fellow of the Vocational Training Council, and Honorary Fellow of the Hong Kong University of Science and Technology. He also serves in many other professional and business associations.

Ir Dr Lo is well connected in China mainland. He is Executive Committee Member of the Zhongshan City Political Consultation Committee, and Committee Member of the China Association of Science and Technology, among his many public duties there.

Ir Dr Lo was awardee of the "Young Industrialist Awards of Hong Kong 1992" and the "Ten Outstanding Young Persons Selection 1992". He was awarded by the Chief Executive of the HKSAR Government Medal of Honour in July 2001 and Bronze Bauhinia Star in July 2009. He has been appointed as a Justice of the Peace since July 2004.

**Thu – 10 Dec, 9.00 to 9.45am**

# Collaboration and Innovation in the 21st Century


## George Farris

*Editor of IEEE Transactions on Engineering Management,*
*Director, Technology Management Research Center,*
*Rutgers Business School, USA*



**Abstract**

As Editor-in-Chief of IEEE Transactions on Engineering Management, I have read over 2,000 papers submitted to the journal. Of these, only a handful were not co-authored. Why is the case? Does collaboration improve quality, or are there other reasons for joint authorship?

As a researcher on performance of industrial scientists and engineers, I have studied relationships between collaboration and innovation. This research has identified key roles which collaboration can play in technical problem solving and situations in which collaboration is more apt to occur. This research focused on face-to-face collaboration, however.

With the explosion of electronic communications in the 21st century, it is likely that the nature of collaboration will evolve, and the changes will have both positive and negative consequences for innovation. Today's talk will review conclusions from research on collaboration and speculate on its implications for work in the 21st century. The ideas presented should provoke a thoughtful review by the audience of their own experiences with collaboration and their best approaches to it in the future.


**About the Keynote Speaker**

George F. Farris is Professor of Management and Director of the Technology Management Research Center at Rutgers University. He is also Editor-in-Chief of the IEEE Transactions on Engineering Management, a Senior Member of the IEEE, and former Division Chair of the Technology and Innovation Management Division of the Academy of Management.

Professor Farris is a Fellow of the American Association for the Advancement of Science (AAAS), the world's largest general scientific society. He was cited "for seminal contributions to the understanding of organizations and personnel practices in the furtherance of technological innovation and the management of technology." His scholarly publications have appeared in journals such as Administrative Science Quarterly, Journal of Applied Psychology and IEEE Transactions on Engineering Management, and his work has been cited several times in the Wall Street Journal.

Previously Professor Farris was Acting Dean of the Graduate School of Management at Rutgers, Professor of Administrative Studies at York University in Canada, Ford Foundation Professor of Management at the European Institute for Advanced Studies in Management in Belgium, and Associate Professor of Organ¬izational Psychology and Management at M. I. T. He has held part-time visiting appointments at Xi'an Jiaotong University, Xi'an, China, the National University of Singapore, and he has presented invited lectures at Sungkyunkwan University, Seoul, South Korea. He received his Ph. D. at the University of Michigan and his Bachelor's at Yale University.

# Meet-the-Editor Panel

**Thu-10 Dec, 9.45 to 10.30am**

**Professor George Farris**
*Professor at Department of Management & Global Business, Director, Technology Management Research Center, Rutgers University, USA*

*Prof. Farris is the Editor-in-Chief of the IEEE Transactions on Engineering Management.*

**Professor Michael Pecht**
*Visiting Professor and Director, CityU Centre for Prognostics and System Health Management, Hong Kong; Director, CALCE Electronics Products and Systems Center, University of Maryland, USA*

*Prof. Pecht is chief editor for Microelectronics Reliability and an associate editor for the IEEE Transactions on Components and Packaging Technology, and he served as chief editor of the IEEE Transactions on Reliability for eight years and on the advisory board of IEEE Spectrum.*

**Professor Hans-Otto Günther**
*Professor at Department of Production Management, Technical University of Berlin, Germany*

*Prof Günther is the Editor-in-Chief of Flexible Services and Manufacturing Journal, a former Managing Editor of OR Spectrum and he serves on the editorial board of a few other international journals.*

**Professor Chung-Lun Li**
*Chair Professor of Logistics Management, Department of Logistics and Maritime Studies, The Hong Kong Polytechnic University, Hong Kong*

*Prof. Li is currently a Senior Editor of Production and Operations Management, Associate Editor of Naval Research Logistics and he also serves on the editorial board of a few other international journals.*

# Session Schedules

**Technology and Knowledge Management 1**

12/9/2009 11:00 - 12:30
Room: Luxembourg I

Chairs: Chui Young Yoon
Yuya Kajikawa

Abstracts: see page 48

- **Designing a Key Performance Indicator System for Technological Innovation Audit at Firm's Level: A Framework and an Empirical Study**
  Hai-Ao Zheng[1], Jean-Jacques Chanaron[2], Jianxin You[1], Xiao-li Chen[3]
  [1]*Chinese Academy of S&T Management, China*
  [2]*Grenoble Ecole de Management, France*
  [3]*Chemnitz University of Technology, Germany*

- **Assessing the Development Phase of Emerging Technology: The Wood Pellets Case**
  Aija Tapaninen[1], Marko Seppänen[1]
  [1]*Tampere University of Technology, Finland*

- **Strategic Management of Technology Objectives in Enterprise Practice - A Conceptual Framework**
  Kari Sahlman[1], Harri Haapasalo[2]
  [1]*Nokia Siemens Networks, Finland*
  [2]*University of Oulu, Finland*

- **How Popular am I outside my own Community: a Mixed Regression model for mapping Technological Innovation in the US Green Energy Sector**
  Piyasi Choudhury[1], Hosein Fallah[1]
  [1]*Stevens Institute of Technology, United States*

- **A Technology Tree Based VND model for Identifying the Top Technologies in the US Renewable Energy Industry**
  Piyasi Choudhury[1], Hosein Fallah[1]
  [1]*Stevens Institute of Technology, United States*

- **The Influence of Export Experience and Export Information Use on Export Knowledge and Performance**
  Ali Hajiha[1], Leila Zamani[1], Hamid Reza Saeednia[1]
  [1]*Islamic Azad University, Iran*

**Technology and Knowledge Management 2**

12/9/2009 13:30 - 15:00
Room: Luxembourg I

Chairs: Jae-Yong Choung
Alan Pilkington

Abstracts: see page 49

- **Innovative Capabilities, Entrepreneurial Process and the Dynamic Growth of University Spin-outs: A Process-Oriented Study with Evidence from China**
  Yuan Zhou[1], Tim Minshall[1], Xiyang He[1], Charles Hampden-Turner[1]
  [1]*University of Cambridge, United Kingdom*

- **Strategic Technology Alliance and Rapid Accumulation of Technological Capabilities in Emerging Economies**
  Hao-Jun Zhou[1], Dong Wu[1], Xiaobo Wu[1], Xinmin Peng[1]
  [1]*Zhejiang University, China*

- **Knowledge Sharing in an Electronics Manufacturing Firm: Evidence from Malaysia**
  Nurliza Mohammed Fathi[1], Uchenna Eze[1], Gerald Guan Gan Goh[1]
  [1]*Multimedia University, Malaysia*

- **Factors Affecting Intention to Quit among IT Professionals**
  Fethi Calisir[1], Cigdem Altin Gumussoy[1], Ibrahim Iskin[2]
  [1]*Istanbul Technical University, Turkey*
  [2]*Portland State University, United States*

- **Early Detection of Innovations from Citation Networks**
  Naoki Shibata[1], Yuy Kajikawa[1], Yoshiyuki Takeda[2], Ichiro Sakata[1], Katsumori Matsushima[1]
  [1]*The University of Tokyo, Japan*
  [2]*Chiba Institute of Technology, Japan*

- **Developing a Novel Patent Map to Explore R&D Directions and Technical Gaps for Thin-film Photovoltaic Industry**
  Dong-Shang Chang[1], Chih-Hsi Kao[1]
  [1]*National Central University, Taiwan*

- **Quantitative Analyses on Claim Structures of Patent Applications Filed by Market Leaders in the Fields of Analyzing and Diagnostic Devices**
  Takashi Miyazawa[1], Hiroshi Osada[2]
  [1]*Seiko Epson Corporation, Japan*
  [2]*Tokyo Institute of Technology, Japan*

**Technology and Knowledge Management 3**

12/9/2009 15:30 - 17:00
Room: Luxembourg I

Chairs: Jean-Jacques Chanaron
Uchenna Eze

Abstracts: see page 50

- **Measuring Individual e-Business Capability Working on an Enterprise e-Business System**
  Chui Young Yoon[1], Keon Myung Lee[1], Seung Kweon Hong[2]
  [1]*Chungbuk National University, South Korea*
  [2]*Chungju National University, South Korea*

- **Applying Grounded Theory to Study Collaborative Climate, Supplier Relationship, Trust, Knowledge Sharing, and Performance in an Organization**
  Chyan Yang[1], Keng-Chieh Yang[1], Shih Yuan Tseng[1]
  [1]*National Chiao Tung Univeristy, Taiwan*

- **Research on the Implementation and Strategy of Organizational Learning**
  Jing Sui[1], Liqiang Deng[1], Jiancheng Yu[2]
  [1]*Nankai University, China*
  [2]*Tianjin Electric Power Corporation, China*

- **Interdisciplinary Research Detection by Citation Indicators**
  Yuy Kajikawa[1], Junichiro Mori[1]
  [1]*The University of Tokyo, Japan*

- **Knowledge Sharing Leveraging New Product Development Activities to Derive Enhanced Business Performance: Mixed Method Study**
  Tsu-Te Huang[1], Rodney Stewart[1], Le Chen[1]
  [1]*Griffith University, Australia*

- **Patterns of Technology Catch-up in Korean Private Sector**
  Jae-Yong Choung[1], Hye-Ran Hwang[2], Tahir Hameed[1]
  [1]*Korea Advanced Institute of Science and Technology, South Korea*
  [2]*Daejeon Development Institute, South Korea*

- **Profiling Innovation System for Solar Photovoltaics in China**
  Ying Guo[1], Donghua Zhu[1], Xuefeng Wang[1]
  [1]*Beijing Institute of Technology, China*

**Manufacturing Systems 1**

12/9/2009 11:00 - 12:30
Room: Luxembourg II

Chairs: Vassilis Dedoussis
Ming Zhou

Abstracts: see page 51

- **Worker Allocation in U-shaped Assembly Lines with Multiple Objectives**
  Ronnachai Sirovetnukul[1], Parames Chutima[2]
  [1]*Mahidol University, Thailand*
  [2]*Chulalongkorn University, Thailand*

- **A Framework for MGrid Resource Service Optimal-selection and Composition**
  Fei Tao[1], L. Zhang[1], D. Zhao[2]
  [1]*Beihang University, China*
  [2]*The University of Michigan-Dearborn, United States*

- **Disassembly Time Evaluation for Enhancing the Reusability of Automotive Components**
  Lily Amelia[1], Dzuraidah Abd. Wahab[1], Ahmad Rasdan Ismail[1], Che Hassan Che Haron[1]
  [1]*Universiti Kebangsaan Malaysia, Malaysia*

- **Optimum Spray Cooling in Continuous Slab Casting Process Uder Productivity Improvement**
  Kiatkajohn Worapradya[1], Purit Thanakijkasem[1]
  [1]*King Mongkut's University of Technology Thonburi, Thailand*

- **A Quantum Particle Swarm Optimization Approach for the Design of Virtual Manufacturing Cells**
  Rahul Caprihan[1], Jannes Slomp[2], Gursaran[1], Khushboo Agarwal[1]
  [1]*Dayalbagh Educational Institute, India*
  [2]*University of Groningen, Netherlands*

- **Empirical Results About the Nash-Cournot Equilibrium**
  Eyal Brill[1], Amnon Gonen[2], Eli Fligel[2], Eduard Goldshtein[2]
  [1]*Decision Makers Ltd., Israel*
  [2]*Holon Institute of Technology, HIT, Israel*

**Manufacturing Systems 2**

12/9/2009 13:30 - 15:00
Room: Luxembourg II

Chairs: Ali Siadat
Rahul Caprihan

Abstracts: see page 52

- **Organizational Innovation of Traditional Manufacturing Industry Based on Industrial Evolution**
  Zheng Ye[1], Ning Cai[1], Jianzhuang Zheng[2]
  [1]*Zhejiang University, China*
  [2]*Zhejiang University City College, China*

- **Research of Chinese Manufacturing System on Game-Schily Theory**
  Li yueen[1], Jun Zhao[1], H.B. Luo[1]
  [1]*Shandong University, China*

- **An Integrated Assembly Sequence Planning and Plant Assignment Model for Products Assembled in a Multi-plant System**
  Yuan-Jye Tseng[1], Jian-Yu Chen[1], Feng-Yi Huang[1]
  [1]*Yuan Ze University, Taiwan*

- **Controlling Flow Time Delays in Flexible Manufacturing Cells**
  Jannes Slomp[1], Rahul Caprihan[2], J.A.C. Bokhorst[1]
  [1]*University of Groningen, Netherlands*
  [2]*Dayalbagh Educational Institute, India*

- **Developing Competitive Products Using Stereolithography Rapid Prototyping Tools**
  Vassilis Dedoussis[1], John Giannatsis[1]
  [1]*University of Piraeus, Greece*

- **Manufacturing Process Management with Aggregated Process Models**
  Mohsen Sadeghi[1], Ali Siadat[1], Jean-Yves Dantan[2], Régis Bigot[1]
  [1]*Arts et Metiers ParisTech, France*
  [2]*Arts et Métiers ParisTech, France*

**Manufacturing Systems 3**

12/9/2009 15:30 - 17:00
Room: Luxembourg II

Chairs: Rui Sousa
Jannes Slomp

Abstracts: see page 53

- **Analysis and Control of Electrical Discharge Machining (EDM) Process**
  Ming Zhou[1], Fuzhu Han[2], Xianyi Meng[1], Baojiang Chen[1]
  [1]*Beijing Institute of Civil Engineering and Architecture, China*
  [2]*Tsinghua University, China*

- **Production Reengineering and Risk**
  Chang Ding[1], Lee Chen[1]
  [1]*California State University, United States*

- **Analytic Model of Machining Errors for Thin Walled Parts Based on the Deformation of the Workpiece-fixture System**
  Faping Zhang[1], Jiping Lu[1], Tang shuiyuan[1], Yan Yan[1], Houfang Sun[1]
  [1]*Beijing Institute of Technology, China*

- **Developing a Model for Integrating Process Planning and Production Planning and Control in Cellular Manufacturing**
  Amir hasanzadeh[1], Omid Moghadardoust[1], Mehdi fathi[2], Reza ramazani khorshiddoost[1]
  [1]*AmirKabir University of Technology, Iran*
  [2]*Iran University of Science and Technology, Iran*

- **Optimization of Dissimilar Joining of Titanium / Aluminum**
  Ezzeddin Anawa[1], Omer Elmabrouk[1], Abdul-ghani Olabi[2]
  [1]*Garyounis University, Libyan Arab Jamahiriya*
  [2]*Dublin City University, Ireland*

- **An Industrial Application of Resource Constrained Scheduling for Quick Changeover**
  Rui Sousa[1], Rui M. Lima[1], Dinis Carvalho[1], Anabela Alves[1]
  [1]*University of Minho, Portugal*

- **Analysis of Generic Product Information Representation Models**
  João Paulo Gomes[1], Rui M. Lima[1], Paulo Martins[1]
  [1]*University of Minho, Portugal*

**Reliability and Maintenance Engineering 1**

12/9/2009 11:00 - 12:30
Room: Luxembourg III

Chairs: Norman Schneidewind
Renzuo Xu

Abstracts: see page 54

- **Maintenance Criticality Analysis Using TOPSIS**
  Anish Sachdeva[1], Pradeep Kumar[2], Dinesh Kumar[2]
  [1]*National Institute of Technology Jalandhar, India*
  [2]*Indian Institute of Technology, India*

- **Failure Rate Calculation: Extending JESD74/JESD74A to Any Sample Size**
  Siyuan Frank Yang[1], Wei-Ting Kary Chien[1]
  [1]*Semiconductor Manufacturing International Corporation, China*

- **Reliability Analysis Methods for an Open Source Software with Their Comparison of Goodness-of-Fit**
  Yoshinobu Tamura[1], Shigeru Yamada[2]
  [1]*Yamaguchi University, Japan*
  [2]*Tottori University, Japan*

- **The Degradation-Rate-Reduction Preventive Maintenance Policies with Warranty in a Finite Time Span**
  Chun-Yuan Cheng[1], Te-Hsiu Sun[1], Jr-Tzung Chen[1], Mei-Ling Liu[2]
  [1]*Chaoyang University of Technology, Taiwan*
  [2]*National Taipei University of Technology, Taiwan*

- **Optimal Backup Time of Database by Differential Backup Method**
  Syouji Nakamura[1], Keiko Nakayama[2], Toshio Nakagawa[3]
  [1]*Kinjo Gakuin University, Japan*
  [2]*Chukyo University, Japan*
  [3]*Aichi Institute of Technology, Japan*

- **Two-Dimensional Software Reliability Measurement Technologies**
  Shinji Inoue[1], Shigeru Yamada[1]
  [1]*Tottori University, Japan*

**Reliability and Maintenance Engineering 2**

12/9/2009 13:30 - 15:00
Room: Luxembourg III

Chairs: Shinji Inoue
Ken McNaught

Abstracts: see page 55

- **ARL Criterion in Bayesian Process Control using Hidden Markov Model**
  Rui Jiang[1], Viliam Makis[1]
  [1]*University of Toronto, Canada*

- **Research on Network Reliability of District Heating Systems Based on the Combined Planar Network Model**
  Peng Wang[1], Pinghua Zou[1]
  [1]*Harbin Institute of Technology, China*

- **The Evaluation of Reliability Indices Of a Restructured Distribution System Considering the Reserve Agreement**
  Ali Saidian[1], Mohamad Amiri[1], Mina Sheikholeslami[2]
  [1]*Shahid Chamran University, Iran*
  [2]*Iran University of Science and Technology, Iran*

- **Applications of Software Reliability Using the IEEE/AIAA Recommended Practice on Software Reliability**
  Norman Schneidewind[1], Mike Hinchey[2]
  [1]*Naval Postgraduate School, United States*
  [2]*Iero, Ireland*

- **Extended Maintenance and Inspection Models for a Parallel System**
  Satoshi Mizutani[1], Toshio Nakagawa[2], Mingchih Chen[3]
  [1]*Aichi University of Technology, Japan*
  [2]*Aichi Institute of Technology, Japan*
  [3]*Chaoyang University of Technology, Taiwan*

- **A General Formulation of Optimal Testing-time Allocation for Modular Systems**
  Xiang Li[1], Min Xie[1], Szu Hui Ng[1]
  [1]*National University of Singapore, Singapore*

**Reliability and Maintenance Engineering 3**

12/9/2009 15:30 - 17:00
Room: Luxembourg III

Chairs: Renyan Jiang
Young C. Park

Abstracts: see page 56

- **Neural-Network-Based Approach on Reliability Prediction of Software in the Maintenance Phase**
  Yung-Chung Chen[1], Xiao-Wei Wang[1]
  [1]*SHU-TE University, Taiwan*

- **Estimation of Cutting Tool Failure Costs**
  Zydrunas Vagnorius[1], Knut Sorby[1]
  [1]*Norwegian University of Science and Technology, Norway*

- **A Model of Open Source Software Maintenance Activities**
  Chengjie Xiong[1], Yanfu Li[1], Min Xie[1], Szu Hui Ng[1], Thong Ngee Goh[1]
  [1]*National University of Singapore, Singapore*

- **A Study of Software Reliability Models Choice Based on Bidirectional Learning Fuzzy Neural Network**
  Bing Chao[1], Renzuo Xu[1], Minyan Gu[2]
  [1]*Wuhan University, China*
  [2]*No.2 Architecture Design Institute of Shijiazhuang, China*

- **Improving Reliability Design of Multi-state K-out-of-N Systems by Fuzzy Programming**
  Vahid Ebrahimipour[1], Ali Azadeh[1], Seyed Fouad Quarashi[1]
  [1]*University of Tehran, Iran*

- **Optimization Multi-state Series Weighted K-out-of-n Systems by Ant Colony Algorithm**
  Vahid Ebrahimipour[1], Ali shabani[1]
  [1]*University of Tehran, Iran*

**Operations Research 1**

12/9/2009 11:00 - 12:30
Room: Montparnasse I

Chairs: Parthasarathy Ramachandran
Shin-Guang Chen

Abstracts: see page 57

- **The Selection of Clients for Promotion Campaigns by Means of Mathematical Programming**
  Fabrice Talla Nobibon[1], Roel Leus[1], Frits Spieksma[1]
  [1]*Katholieke Universiteit Leuven, Belgium*

- **Cooperative Coevolutionary Optimization Method for Product Family Design**
  Lothar Schulze[1], Li Li[1]
  [1]*Leibniz University Hannover, Germany*

- **Charlemagne's Challenge: The Periodic Latency Problem**
  Sofie Coene[1], Gerhard Woeginger[2], Frits Spieksma[1]
  [1]*Katholieke Universiteit Leuven, Belgium*
  [2]*Technical University Eindhoven, Netherlands*

- **Stage-lookahead Dynamic Programming Algorithms for Stochastic Problems with Time-lagged Control Dynamics**
  Eiji Mizutani[1], Stuart Dreyfus[2]
  [1]*National Taiwan University of Science and Technology, Taiwan*
  [2]*University of California at Berkeley, United States*

- **Scatter Search for a Real-life Fleet Size and Mix Vehicle Routing Problem with Time Windows in Iran**
  Ahmad Reza Pourghaderi[1], Seyed Ali Torabi[1], Saeideh Sekhavat[2]
  [1]*University of Tehran, Iran*
  [2]*University of Isfahan, Iran*

- **Logistics Planning for Agricultural Vehicles**
  Osman Ali[1], Dirk VanOudheusden[1]
  [1]*Katholieke Universiteit, Belgium*

**Operations Research 2**

12/9/2009 13:30 - 15:00
Room: Montparnasse I

Chairs: Lothar Schulze
Sofie Coene

Abstracts: see page 58

- **Efficiency Evaluation of Natural Gas Power Plants Using Data Envelopment Analysis**
  Styliani Sofianopoulou[1], Vassilis Dedoussis[1], Konstantinos Konstas[1], Agelos Kassimis[1]
  [1]*University of Piraeus, Greece*

- **Solving a Dock Assignment Problem as a Three-stage Flexible Flow-shop Problem**
  Lotte Berghman[1], Roel Leus[1]
  [1]*Katholieke Universiteit Leuven, Belgium*

- **R&D Project Planning with Multiple Trials in Uncertain Environments**
  Stefan Creemers[1], Bert De Reyck[2], Roel Leus[1]
  [1]*Katholieke Universiteit Leuven, Belgium*
  [2]*University College London, United Kingdom*

- **Risk Prediction of Marine Traffic Based on Fractal Interpolation Algorithm**
  Shenping Hu[1], Zhiyu Chen[1], Cunqiang Cai[1], Jinpeng Zhang[1]
  [1]*Shanghai Maritime University, China*

- **Scheduling Outpatients in Hospital Examination Departments**
  Xiaofeng Hu[1], Hui Wu[1], Shaoming Zhang[2], Xing Dai[2], Ye Jin[1]
  [1]*Shanghai Jiao Tong University, China*
  [2]*Shanghai Ninth People Hospital, China*

- **Vehicle Routing Problem with Load Compatibility Constraints**
  Parthasarathy Ramachandran[1]
  [1]*Indian Institute of Science, India*

- **The Best Exponents of Corporate Social Responsibility and Organisation Behaviour**
  Alex Manzoni[1], Sardar Islam[1]
  [1]*Victoria University, Australia*

**Operations Research 3**

12/9/2009 15:30 - 17:00
Room: Montparnasse I

Chairs: Kenneth Sorensen
Roel Leus

Abstracts: see page 59

- **Impact of Initial Wealth on Newsvendor Problem with S-Shaped Utility**
  Wei Geng[1], Xiaobo Zhao[1]
  [1]*Tsinghua University, China*

- **A Two Step Approach Including Scatter Search Algorithm for the Integrated Procurement, Production and Distribution Planning**
  Ahmad Reza Pourghaderi[1], Seyed Ali Torabi[1], Saeideh Sekhavat[2]
  [1]*University of Tehran, Iran*
  [2]*University of Isfahan, Iran*

- **A Chance-Constrained Programming of Fourth-Party Logistics Routing Problem with Fuzzy Duration Time**
  Yan Cui[1], Min Huang[1], Xingwei Wang[1], Loo Hay Lee[2]
  [1]*Northeastern University, China*
  [2]*National University of Singapore, Singapore*

- **A Non-Oscillating Beam-Search with a Look-ahead for the Circular Packing Problem**
  Hakim Akeb[1], Mhand Hifi[2], Rym M'Hallah[3]
  [1]*ISC Paris School of Management, France, Metropolitan*
  [2]*Univesité de Picardie Jules Verne, France, Metropolitan*
  [3]*Kuwait University, Kuwait*

- **Reference Effect and Inventory Constraint on Optimal Pricing for Daily Perishable Products**
  Takeshi Koide[1], Hiroaki Sandoh[2]
  [1]*Konan University, Japan*
  [2]*Osaka University, Japan*

- **Application of Evolutionary Computing on Least-cost Water Distribution Network Designs**
  Min-Der Lin[1], Chien-Wei Chu[1], Gee-Fon Liu[1], Zong-Hua Wu[1], Shuang-Fu Yeh[1]
  [1]*National Chung Hsing University, Taiwan*

- **Development of Queuing Models with Balking and Uncertain Data using Fuzzy Set Theory**
  David de la Fuente[1], Maria Jose Pardo[2]
  [1]*Oviedo University, Spain*
  [2]*Basque Country University, Spain*

- **Some New Models for Capital Budgeting: Realistic Representations of Financial Decision Making by Firms**
  Bruce Craven[1], Sardar Islam[2]
  [1]*University of Melbourne, Australia*
  [2]*Victoria University, Australia*

## Quality Control and Management 1

12/9/2009 11:00 - 12:30
Room: Montparnasse II

Chairs: Flavio Fogliatto
Yi-Hui Liang

Abstracts: see page 60

- **Proposed Xbar and S Control Charts for Skewed Distributions**
  Michael Boon Chong Khoo[1], Abdu Mohammed Ali Atta[1], Chen Chung-Ho[2]
  [1]*Universiti Sains Malaysia, Malaysia*
  [2]*Southern Taiwan University, Taiwan*

- **Software Security Characteristics for Function Point Analysis**
  Nur Atiqah Sia Abdullah[1], Rusli Abdullah[2], Mohd Hasan Selamat[2], Azmi Jaafar[2]
  [1]*Universiti Teknologi MARA, Malaysia*
  [2]*University Putra Malaysia, Malaysia*

- **A Technical Framework of the Taguchi System Design Method Based on Axiomatic Design and TRIZ**
  Yihai He[1], Zhao Ma[1], Wenbing Chang[1]
  [1]*Beijing University of Aeronautics and Astronautics, China*

- **Interoperability of QFD, FMEA, and KCs Methods in the Product Development Process**
  Alaa Hassan[1], Ali Siadat[1], Jean-Yves Dantan[1], Patrick Martin[1]
  [1]*Arts et Métiers ParisTech, France*

- **An Advanced CUSUM Chart for Attributes**
  Yanjing Ou[1], Roger Jiao[2], Zhang Wu[1]
  [1]*Nanyang Technological University, Singapore*
  [2]*Georgia Institute of Technology, United States*

- **A CUSUM Chart Using Absolute Sample Values to Monitor Process Mean and Variance**
  Zhang Wu[1], Mei Yang[1]
  [1]*Nanyang Technological University, Singapore*

## Quality Control and Management 2

12/9/2009 13:30 - 15:00
Room: Montparnasse II

Chairs: Michael Boon Chong Khoo
Panagiotis Trivellas

Abstracts: see page 61

- **A Support Vector Machine-Based Pattern Recognizer Using Selected Features for Control Chart Patterns Analysis**
  Chuen-Sheng Cheng[1], Hui-Ping Cheng[2], Kuo-Ko Huang[1]
  [1]*Yuan-Ze University, Taiwan*
  [2]*MingDao University, Taiwan*

- **A MEWMA Chart for a Bivariate Exponential Distribution**
  Yujuan Xie[1], Min Xie[1], Thong Ngee Goh[1]
  [1]*National University of Singapore, Singapore*

- **Interpreting the Mean Shift Signals in Multivariate Control Charts Using Support Vector Machine-based Classifier**
  Chuen-Sheng Cheng[1], Hui-Ping Cheng[2], Kuo-Ko Huang[1]
  [1]*Yuan-Ze University, Taiwan*
  [2]*MingDao University, Taiwan*

- **Multivariate Statistical Control of Batch Processes with Variable Duration**
  Flavio Fogliatto[1], Ndeye Niang[2]
  [1]*Federal Univ of Rio Grande do Sul, Brazil*
  [2]*Conservatoire National des Arts et Metiers, France*

- **The Link Between Total Quality Management and Organizational Performance in Malaysian Automotive Industry: The Mediating Role of ISO/TS16949 Efforts**
  Norhayati Zakuan[1], Sha'ri Mohd Yusof[2], Awaluddin Mohd. Shaharoun[3]
  [1]*University of Tun Hussien Onn, Malaysia*
  [2]*Universiti Teknologi Malaysia, Malaysia*
  [3]*University of Technology Malaysia, Malaysia*

- **Enhancing Organizational Quality Efforts through Incorporating of Motivational Aspects**
  Alexander Nielen[1], Sebastian Vetter[1], Helmut Lieb[1], Christopher M. Schlick[1], Robert Schmitt[1]
  [1]*RWTH Aachen University, Germany*

## Quality Control and Management 3

12/9/2009 15:30 - 17:00
Room: Montparnasse II

Chairs: C.K. Kwong
Jianjun Wu

Abstracts: see page 62

- **A Research of Using MDM System for Increasing Data Quality and Property to Make Effective Business System in Company**
  SungWoo Kang[1], SunIl Oh[1], JoongHyun Cho[1]
  [1]*Myongji university, South Korea*

- **An Enhanced Residual MEWMA Control Chart for Monitoring Autocorrelated Data**
  Giovanna Capizzi[1], Guido Masarotto[1]
  [1]*University of Padua, Italy*

- **TQM and Innovation Performance in Manufacturing SMEs: The Mediating Effect of Job Satisfaction**
  Panagiotis Trivellas[1], Ilias Santouridis[1]
  [1]*Technological Education Institute of Larissa, Greece*

- **A Taguchi Method for Safety Design of Artificial Marble Products**
  Wen-Pai Wang[1], Chung-Shang Chang[2], Yu Hsiu Lee[1]
  [1]*National Chin-Yi University of Technology, Taiwan*
  [2]*Chienkuo Technology University, Taiwan*

- **Adimax Chart for Monitoring Univariate Processes**
  Harikrishnan Kanthen K[1], Chinna Karuthan[2], Krishna Guru Balachander[3]
  [1]*Nottingham University Malaysia Campus, Malaysia*
  [2]*University Technology MARA, Malaysia*
  [3]*Monash University Malaysia, Malaysia*

- **Supplier Evaluation with Quality-Based Fuzzy Data**
  Ching Yi chiang[1], Ming-Hung Shu[1]
  [1]*National Kaohsiung University of Applied Sciences, Taiwan*

**Supply Chain Management 1**

12/9/2009 11:00 - 12:30
Room: Montparnasse III

Chairs: Ali Diabat
Van-Dat Cung

Abstracts: see page 63

- **An Empirical Investigation of RFID Adoption and Improving Process Performance in the Manufacturing Supply Chain**
  Wei Chen Tsai[1], Ling Lang Tang[2]
  [1]*Aletheia University, Taiwan*
  [2]*Yuan Ze University, Taiwan*

- **An Exploratory Study of Purchasing and Supply Management in Hong Kong Industries**
  Antonio Ka Wing Lau[1], Susan To[2], Richard Yam[2]
  [1]*Institute of Supply Management Hong Kong, Hong Kong*
  [2]*City University of Hong Kong, Hong Kong*

- **Accountability-based Reengineering of an Order Fulfillment Process**
  Linda Zhang[1], Roger Jiao[2], Qinhai Ma[3]
  [1]*University of Groningen, Netherlands*
  [2]*Georgia Institute of Technology, United States*
  [3]*Northeastern University, China*

- **The Effect of Model Change from Direct to Distribution on Buyer-Supplier Behavior and Relationship**
  Xiaocui Jiang[1], Haiqi Wang[1], Qiang Lu[1], Xiaoling Zhang[1]
  [1]*Harbin Institute of Technology, China*

- **TIME for Performance Improvement: Targeting Innovation in Manufacturing Engineering**
  Susan Morton[1], Roula Michaelides[2], Neil Burns[1], Chris Backhouse[1]
  [1]*Loughborough University, United Kingdom*
  [2]*Liverpool University, United Kingdom*

- **The Analysis of Decision-making of Investing in the Bi-national Marketing Channel with Game Options**
  Tyrone T. Lin[1], Shih-Ting Wang[1]
  [1]*National Dong Hwa University, Taiwan*

**Supply Chain Management 2**

12/9/2009 13:30 - 15:00
Room: Montparnasse III

Chairs: Linda Zhang
Nermine Harraz

Abstracts: see page 64

- **An Efficient Multiobjective Evolutionary Approach for a Simultaneous Inventory Control and Facility Location Problem**
  Shu-Hsien Liao[1], Chia-Lin Hsieh[2], Wen-Min Chou[2]
  [1]*Tamkang University, Taiwan*
  [2]*Aletheia University, Taiwan*

- **Assessing Flexibility in Supply Chain Using Adaptive Neuro Fuzzy Inference System**
  Hosein didekhani[1], Javad Jassbi[1], Nazanin Pilevari[1]
  [1]*Islamic Azad University, Science & Research Branch, Iran*

- **Optimization Modeling of An Integrated Supply Chain Network**
  Ali Diabat[1], Jean Philippe Richard[2]
  [1]*Masdar Institute of Science and Technology, United Arab Emirates*
  [2]*University of Florida, United States*

- **A Carbon-Capped Supply Chain Network Problem**
  Ali Diabat[1], David Simchi-Levi[2]
  [1]*Masdar Institute of Science and Technology, United Arab Emirates*
  [2]*Massachusetts Institute of Technology, United States*

- **Optimizing Supply Chain Replenishing Policy for Green Short Life-Cycle Product Considering Ecological Product Design Value, Remanufacturing and Warranty-Dependent Demand**
  Chun-Jen Chung[1], Hui-Ming Wee[2]
  [1]*Aletheia University, Taiwan*
  [2]*Chung Yuan Christian University, Taiwan*

- **A Lost-sale Inventory System with Dual Supply and Multiple Demand Classes**
  Yun Zhou[1], Xiaobo Zhao[1]
  [1]*Tsinghua University, China*

**Supply Chain Management 3**

12/9/2009 15:30 - 17:00
Room: Montparnasse III

Chairs: Carman Lee
Christian-Andreas Schumann

Abstracts: see page 65

- **A Tree-based Wall-building Algorithm for Solving Container Loading Problem with Multi-drop Constraints**
  Li Pan[1], Sydney Chu[1], Guangyue Han[1], Joshua Huang[1]
  [1]*The University of Hong Kong, Hong Kong*

- **Determining the Storage Location for Outbound Containers in a Maritime Terminal**
  Lu Chen[1], Andre Langevin[2]
  [1]*Shanghai Jiao Tong University, China*
  [2]*Ecole Polytechnique de Montreal, Canada*

- **Economic Production Quantity (EPQ) Deteriorating Inventory Model with Breakdown Machine, Stochastic Repair and Maintenance Time and Lost Sales**
  Gede Widyadana[1], Hui-Ming Wee[1]
  [1]*Chung Yuan Christian University, Taiwan*

- **Managing the Complexity of the Supply Chain**
  Nunzia Carbonara[1], Ilaria Giannoccaro[1]
  [1]*Politecnico di Bari, Italy*

- **State-space Proportional-integral Inventory Replenishment Practices for Bullwhip Effect Investigation in Supply Chains**
  Christos Papanagnou[1], Panagiotis Tzionas[1]
  [1]*Alexander Technological Institute of Thessaloniki, Greece*

- **Sustainable Recovery Network Design**
  Noha Galal[1], Nermine Harraz[2], Nashaat Fors[2], Hamdy Elwany[2]
  [1]*Alexandria Higher Institute of Engineering and Technology, Egypt*
  [2]*Alexandria University, Egypt*

**Project Management 1**

12/9/2009 11:00 - 12:30
Room: Montparnasse IV

Chairs: Simon Philbin
Pandelis Ipsilandis

Abstracts: see page 66

- **An Empirical Investigation of the Impacts of ERP Consultant Selections and Project Management on ERP IS Success Assessment**
  Wen-Hsien Tsai[1], Yu-Shan Shen[1], Pei-Ling Lee[1], Lopin Kuo[2]
  [1]*National Central University, Taiwan*
  [2]*Tamkang University, Taiwan*

- **On Implementation of Waste Management Systems in the Hong Kong Construction Industry using Spectral Methods**
  Vivian Tam[1], Khoa Le[1]
  [1]*University of Western Sydney, Australia*

- **A Framework for Incorporating Time, Cost, and Fidelity Tradeoffs among Design Assessment Methods in Product Development**
  Michael Johnson[1]
  [1]*Texas A&M University, United States*

- **Comparison of Project Objectives and Critical Factors between DBB and DB in China**
  Yongqiang Chen[1], Xingyu Zhu[1], Ning Zhang[1]
  [1]*Tianjin University, China*

- **Application of Structural Equation Modeling to Assign the Weights for Evaluation Indexes of Brownfield Development Project**
  Yuming Zhu[1], Haitang Su[1], Quan Pan[1], Peng Guo[1], Mingjie Yu[1]
  [1]*Northwestern Polytechnical University, China*

- **Research on Project Portfolio Selection and Decision-making Process Based on Lotka-Volterra Model**
  Peng Guo[1], Junfei Hu[1], Nvzhao Pan[1], Yuming Zhu[1]
  [1]*Northwestern Polytechnical University, China*

**Project Management 2**

12/9/2009 13:30 - 15:00
Room: Montparnasse IV

Chairs: Vivian Tam
Yong Qiang Chen

Abstracts: see page 67

- **IS Development Activities and Methodologies in Practice: A Survey of the IT Sector in China**
  Bo Yan[1], Younes Benslimane[2], Zijiang Yang[2]
  [1]*Beijing Institute of Technology, China*
  [2]*York University, Canada*

- **The Study on Paradigm Shift of Project Management Based on Complexity Science –Project Management Innovations in Shanghai 2010 EXPO Construction Program**
  Qinghua He[1], Weiping Jiang[1], Yongkui Li[1], Yun Le[1]
  [1]*Tongji University, China*

- **Investigation of a Systems-Based Design and Planning Approach to a Facilities Development Project**
  Simon Philbin[1]
  [1]*Imperial College London, United Kingdom*

- **Risk Classification of Projects in EU Operational Programmes According to Their S-curve Characteristics. A Case Study Approach**
  Pandelis Ipsilandis[1]
  [1]*Technological Education Institute of Larissa, Greece*

- **Designing a Multi Criteria Evaluation Model for Project Teams**
  Chang-Lin Yang[1], Rong-Hwa Huang[1], Jin-Ja Ho[1]
  [1]*Fu Jen Catholic University, Taiwan*

- **An Optimal Coordination Method for Software Development**
  Suxiu Xu[1], Zhuoxin Li[1], Qiang Lu[1], Gang Li[1], Li Huang[1]
  [1]*Harbin Institute of Technology, China*

**Project Management 3**

12/9/2009 15:30 - 17:00
Room: Montparnasse IV

Chairs: Michael Johnson
Arik Sadeh

Abstracts: see page 68

- **Resource-constrained Scheduling of a Real Project from the Construction Industry: A Comparison of Software Packages for Project Management**
  Norbert Trautmann[1], Philipp Baumann[1]
  [1]*University of Bern, Switzerland*

- **Towards an Outcome Based Project Management Theory**
  Ofer Zwikael[1], John Smyrk[1]
  [1]*The Australian National University, Australia*

- **Analysis of Work Style in Operation & Maintenance of Information Systems: Proposal of New Problem-analysis Method Based on Inter-project Learning Aided by Ethnography**
  Sadayo Hirata[1], Hiroshi Osada[1]
  [1]*Tokyo Institute of Technology, Japan*

- **The Behaviour of Dispute Resolution Methods in Malaysian Construction Industry**
  Heap-Yih Chong[1], Rosli Mohamad Zin[2]
  [1]*Universiti Tunku Abdul Rahman, Malaysia*
  [2]*Universiti Teknologi Malaysia, Malaysia*

- **Criteria for Screening New Products in the Electronic Component Distribution Industry**
  Chi-Lung Chui[1]
  [1]*City University of Hong Kong, Hong Kong*

- **Research on Influencing Factors of Selecting Construction Agent Based on Project Governance**
  Ling Yan[1], Ran Xing[1]
  [1]*Tianjin University of Technology, China*

**Intelligent Systems 1**

12/9/2009 11:00 - 12:30
Room: Montparnasse V

Chairs: Anan Suebsomran
Marc Wouters

Abstracts: see page 69

- **Design and Implementation of Machine Tool Static Error Feedback Model**
  Sanjeev Kumar[1], Parag Vichare[1], Aydin Nassehi[1], Vimal Dhokia[1], Stephen Newman[1]
  [1]*University of Bath, United Kingdom*

- **Using an Artificial Neural Network to Forecast the Market Share of Thai Rice**
  Arthit Apichottanakul[1], K. Piewthongngam[1], S. Pathumnakul[1]
  [1]*Khon Kaen University, Thailand*

- **Stability Analysis of a Continuous-time T-S Fuzzy System**
  Hung-Yuan Chung[1], Sheng-Chung Chan[1]
  [1]*National Central University, Taiwan*

- **Electromagnetic Actuated CVT System for Vehicle**
  Md. Ataur Rahman[1], A.K.M. Mohiuddin[1], Ahmed Faris Ismail[1]
  [1]*International islamic University Malaysia, Malaysia*

- **The Restrictions in Economic Design Model for an X-bar Control Chart Under Non-normally Distributed Data with Weibull Shock Model**
  Feng-Chia Li[1], Tzn-Chin Chao[2], Li-Lon Yeh[3], YenFu Chen[1]
  [1]*Jen Teh Junior College of Management, Taiwan*
  [2]*Hwa Hsia College, Taiwan*
  [3]*Tsing Hwa University, Taiwan*

- **Comparison of the Primitive Classifiers with Extreme Learning Machine in Credit Scoring**
  Feng-Chia Li[1], Peng-Kai Wang[2], Gwo-En Wang[3]
  [1]*Jen Teh Junior College of Management, Taiwan*
  [2]*Hwa Hsia Institute of Technology, Taiwan*
  [3]*University, Taiwan*

**Intelligent Systems 2**

12/9/2009 13:30 - 15:00
Room: Montparnasse V

Chairs: Hung-Yuan Chung
Stephen Newman

Abstracts: see page 70

- **Logic of Probability Entailment with Threshold-Surety**
  Yong li[1], WeiYi Liu[2]
  [1]*Kunming University of Science and Technology, China*
  [2]*Yunnan University, China*

- **Automatic Guided Vehicle Control by Vision System**
  Suthep Butdee[1], Anan Suebsomran[1]
  [1]*King Mongkut's University of Technology North Bangkok, Thailand*

- **Unsupervised Clustering for Electrofused Magnesium Oxide Sorting**
  Daniel Pun[1], Shawkat Ali[1]
  [1]*CQUniversity Australia, Australia*

- **Fuzzy Clustering Decision Tree for Classifying Working Wafers of Ion Implanter**
  Shih-Cheng Horng[1], Yu-Liang Hsiao[1]
  [1]*Chaoyang University of Technology, Taiwan*

- **Applying Neural Networks to Detect the Failures of Turbines in Thermal Power Facilities**
  Kai-Ying Chen[1], Long-Sheng Chen[2], Mu-Chen Chen[3], Chia-Lung Lee[1]
  [1]*National Taipei University of Technology, Taiwan*
  [2]*Chaoyang University of Technology, Taiwan*
  [3]*National Chiao Tung University, Taiwan*

- **Q(λ) Learning Technique for Ph Control**
  Syafiie Syafiie[1], Tadeo Fernando[2], Ernesto Martinez[3]
  [1]*University Putra Malaysia, Malaysia*
  [2]*University of Valladolid, Spain*
  [3]*Consejo Nacional de Investigaciones Científicas y Técnicas, Argentina*

- **Agent-based Cloud Commerce**
  (Ben) Kwang Mong Sim[1]
  [1]*Gwangju Institute of Science & Technology, South Korea*

**Decision Analysis and Methods 1**

12/9/2009 15:30 - 17:00
Room: Montparnasse V

Chairs: Amnon Gonen
Parimal Acharjee

Abstracts: see page 71

- **Optimal Strategy Model of Electricity Purchasing and Sales for Retail Electricity Providers Using Conditional Value at Risk Theory**
  Yu Cheng[1], Qingxia Wang[1], Yefei Sun[2]
  [1]*North China Electric Power University, China*
  [2]*Changping Power Supply Company of Beijing Electric Power Company, China*

- **Building A Consumer Experience Framework in Housing Refurbishment Service Industry**
  Ching-Yu Lien[1], Chih-Wen Huang[2]
  [1]*Ming Hsin University of Science and Technology, Taiwan*
  [2]*Tamkang University, Taiwan*

- **A Decision Analysis for Introducing Corporate Social Responsibility on Science and Technology Industry**
  Tyrone T. Lin[1], Pei-Hsin Lai[1]
  [1]*National Dong Hwa University, Taiwan*

- **Development of a Hybrid Model to Improve the Efficiency of Business Process Reengineering**
  Wen-Hsien Tsai[1], Ching Chien Yang[2], Hsiao- Chiao Kuo[1]
  [1]*National Central University, Taiwan*
  [2]*ChungChou Institute of Technology, Taiwan*

- **A Systems Approach for Hospital Inpatient Bed Capacity Planning**
  Balagopal Gopakumar[1], Shengyong Wang[1], Mohammad Khasawneh[1], Krishnaswami Srihari[1], Tejas Gandhi[2], Ninfa Saunders[2]
  [1]*State University of New York, Binghamton, United States*
  [2]*Virtua Health, United States*

- **The Bi-objective Stochastic Chance-Constrained Optimization Model of Multi-Project & Multi-Item Investment Combination Based on the View of Real Options**
  Bin Xu[1], Jing Yu[2], Yan Meng[1]
  [1]*Central University of Finance and Economic, China*
  [2]*China Science Academy, China*

- **The Option-Game Analyses on Pricing Decision of the Target Enterprise of M&A under Fuzzy Information Surroundings**
  Jing Yu[1], Bin Xu[2], Yuanhua Wang[3]
  [1]*China Science Academy, China*
  [2]*Central University of Finance and Economic, China*
  [3]*Beijing Institute of Clothing Technology, China*

**Poster Session 1**

12/9/2009 15:00 - 15:30
Room: Longchamps I & II

**Technology and Knowledge Management 4**

12/10/2009 11:00 - 12:30
Room: Luxembourg I

Chairs: Shann-Bin Chang
Kevin Tseng

Abstracts: see page 78

- **Knowledge and Technology Transfer between Universities and Firms: A Case Study from a European University**
  Antonio Aguiar[1], Antonio Reis[1]
  [1]*Technical University of Lisbon, Portugal*

- **Utilization of Knowledge Management by Medical Device Manufactures in Japan**
  Seiya Shimanuki[1], Tomoko Saiki[1]
  [1]*Tokyo Institute of Technology, Japan*

- **Selecting R&D Projects for Technology-Based Innovation: An Application of the Core Model Approach**
  Michael Tow Cheung[1], Paul F. Greenfield[2], Ziqi Liao[3]
  [1]*University of Hong Kong, Hong Kong*
  [2]*University of Queensland, Australia*
  [3]*Hong Kong Baptist University, Hong Kong*

- **Design of Enhanced Software Protection Architecutre by Using Theory of Inventive Problem Solving**
  Song-Kyoo Kim[1]
  [1]*Samsung Electronics Co. Ltd, South Korea*

- **The Role of Knowledge-intensive Business Service in the Evolution of Cluster Network Structure: An Empirical Study from China Socks Cluster**
  Haiyan Zhu[1], Jiang Wei[2]
  [1]*Capital University of Economics and Business, China*
  [2]*Zhejiang University, China*

- **Prioritizing Critical Factors of Team Innovation – The Application of Grey Relational Analysis**
  Lien-An Hsu[1], Chien Chiang Lin[2], Ting-Chun Lu[1], Hsu-Feng Hung[1]
  [1]*National ChengChi University, Taiwan*
  [2]*Shih Hsin University, Taiwan*

- **Taiwanese and Norwegian Engineering Students' Self-Image of Academic Abilities, Grades and Course Satisfaction**
  Hua-Li Jian[1], Frode Eika Sandnes[2]
  [1]*National Cheng Kung University, Taiwan*
  [2]*Oslo University College, Norway*

**Technology and Knowledge Management 5**

12/10/2009 13:30 - 15:00
Room: Luxembourg I

Chairs: Yung-Hsin Chen
Hong-Feng Lai

Abstracts: see page 79

- **Knowledge Management Process and New Product Development Performance in a Malaysian Research and Development Organisation**
  Wan Amal Wan Zaaimuddin[1], Gerald Guan Gan Goh[1], Uchenna Eze[1]
  [1]*Multimedia University, Malaysia*

- **Knowledge Decision Support Model for Collaborative Product Innovation**
  Yu yang[1], Xuedong Liang[1], Jie Yang[1], Zijun Zhou[1], Jing wang[1]
  [1]*Chongqing University, China*

- **Process-based Structuring Knowledge in Product Development**
  Qian-Wang Deng[1], Li-Ping Yang[1], Xin-Wei Wang[1]
  [1]*Hunan University, China*

- **Adaptability Design to Meet Dynamic Customer's Needs**
  Nattawut Janthong[1], Daniel Brissaud[1], Suthep Butdee[2]
  [1]*University of Grenoble, France*
  [2]*King Mongkut's University of Technology North Bangkok, Thailand*

- **An Analysis on the Indian Government Policies in 2007 - For Sustained Growth of R&D Activities**
  Narayanan Srinivasan[1]
  [1]*Jawaharlal Nehru Technical University, India*

- **IRB System for Assisting the Development of Intelligent Medical Devices**
  Kevin Tseng[1], Chien-Lung Hsu[1]
  [1]*Chang Gung University, Taiwan*

**Technology and Knowledge Management 6**

12/10/2009 15:30 - 17:00
Room: Luxembourg I

Chairs: Jiang Wei
Hung-Yi Chen

Abstracts: see page 80

- **Customer Value Propositions for Technology Commercialization: Investigating the Feasibility of a Real Options Approach**
  Marc Wouters[1]
  [1]*University of Twente, Netherlands*

- **Theoretical Study on Technology Threat Early Warning Management**
  Yuangen lai[1]
  [1]*Institute of Scientific & Technical Information of China, China*

- **Analyzing Inter-Firm Networks for Enhancing Large-scale Regional Clusters**
  Junichiro Mori[1], Yuy Kajikawa[1], Ichiro Sakata[1]
  [1]*The University of Tokyo, Japan*

- **A Model of the Determinants of Purchase of Home Security and Remote Control Equipments**
  Kuo-Shun Sun[1], C. N. Huang[2], Y. B. Chen[1]
  [1]*Kainan University, Taiwan*
  [2]*Central Police University, Taiwan*

- **The Effects of Interfirm Network on Firm Growth: A Case Study**
  Xinmin Peng[1], Haiting Huang[2]
  [1]*Zhejiang University, China*
  [2]*Zhejiang Textile & Fashion College, China*

- **Construction of Knowledge Based Engineering Platform for Armored Vehicle**
  Guoxin Wang[1], Yan Yan[1], Lichen Hu[2], Xiang Zhang[1], Lu Wang[1]
  [1]*Beijing Institute of Technology, China*
  [2]*China North Vehicle Research Institute, China*

- **The Mechanism of Innovation Capability Leveraging Via Strategy in SMEs**
  Litian Chen[1], Qingrui Xu[1]
  [1]*Zhejiang University, China*

**Production Planning and Control 1**

12/10/2009 11:00 - 12:30
Room: Luxembourg II

Chairs: Stuart C. So
Martin Grunow

Abstracts: see page 81

- **Designing a Fuzzy Rule-based System for Selecting the Proper Lot-sizing Technique**
  Soheil Sadi-nezhad[1], Leila Bashshash[1]
  [1]*Islamic Azad University, Iran*

- **The Patent Design Around Method Based on TRIZ**
  Ping Jiang[1], Jinjin Zhai[1], Zishun Chen[1], Runhua Tan[1]
  [1]*Hebei University of Technology, China*

- **Enhancing Local Scheduling Rules with a Global Benefit Factor**
  Jörg Sigrist[1], Christoph Heitz[1]
  [1]*Zurich University of Applied Sciences, Switzerland*

- **Modeling Intermediate Product Selection Under Production and Storage Capacity Limitations in Food Processing**
  Onur Alper Kilic[1], Renzo Akkerman[2], Martin Grunow[2], Dirk Pieter Van Donk[1]
  [1]*University of Groningen, Netherlands*
  [2]*Technical University of Denmark, Denmark*

- **Worker Productivity, Occupational Health, Safety and Environmental Issues in Thermal Power Plant.**
  Hole Jitendra[1], Mukesh Pande[1]
  [1]*Rajiv Gandhi Technological University, India*

**Production Planning and Control 2**

12/10/2009 13:30 - 15:00
Room: Luxembourg II

Chairs: Soheil Sadi-nezhad
Carman Lee

Abstracts: see page 82

- **A Computational Framework for Learning Production Planning Policies**
  Srinivas Narasimhamurthy[1], Durga Prasad Muni[1]
  [1]*Infosys Technologies Limited, India*

- **Scheduling Utility Workers at Mixed-Model Assembly Lines**
  Rico Gujjula[1], Hans-Otto Guenther[1]
  [1]*Technical University of Berlin, Germany*

- **Modeling a PCB Assembly Line with Modular Reconfigurable Placement Machines**
  Aiying Rong[1], Attila Toth[2], Olli Nevalainen[1], Risto Lahdelma[1], Timo Knuutila[1]
  [1]*University of Turku, Finland*
  [2]*University of Szeged, Hungary*

- **The Research on Job Shop On-line Scheduling with Random Release-date**
  Jing Yin[1], Baojiang Chen[1]
  [1]*Beijing University of Civil Engineering and Architecture, China*

- **Research on MRP/JIT Integration and Application in Medical Equipment Production Management Concerned with Spare Part Manufacturing**
  Qinghua Zhang[1], Guoquan Cheng[1], Zhuan Wang[1], Bo He[1]
  [1]*University of Science and Technology Beijing, China*

- **An Integrated Approach to Lot Sizing and Cutting Stock Problems**
  Mohsin Malik[1], Min Qiu[1], John Taplin[1]
  [1]*University of Western Australia, Australia*

**Production Planning and Control 3**

12/10/2009 15:30 - 17:00
Room: Luxembourg II

Chairs: Christoph Schwindt
Songlin Chen

Abstracts: see page 83

- **A Mathematical Model for Workload Distribution and Balance with Setup Times Under Finite Capacity Constraints**
  Yunfang Peng[1], Zailin Guan[1], Jianhua Tao[2]
  [1]*Huazhong University of Science and Technology, China*
  [2]*Guangzhou University, China*

- **Integrated Design Structure System for Modular Design in Products Development**
  Chung-Shing Wang[1], Wei-Hua Wang[1], Teng-Ruey Chang[1], Ming-Ching Lin[1]
  [1]*Tung-Hai University, Taiwan*

- **Scheduling Asphalt Highway Construction Operations Using the Combination of Line-of-Balance and Discrete Event Simulation Techniques**
  Gul Polat[1], Yalcin Buyuksaracoglu[2], Atilla Damci[1]
  [1]*Istanbul Technical University, Turkey*
  [2]*Polimeks Construction, Turkey*

- **A Heuristic Approach for Short Term Operations Planning in a Catering Company**
  Poorya Farahani[1], Martin Grunow[1], Hans-Otto Guenther[2]
  [1]*Technical University of Denmark, Denmark*
  [2]*Technical University of Berlin, Germany*

- **Modelling the Long Term Impact of Existing Products on Perceived Value of New Products**
  Bingwen Yan[1], Oluwole Daniel Makinde[1]
  [1]*Cape Peninsula University of Technology, South Africa*

- **Engineering Adaptive Production Control Strategies for Complex Discrete Manufacturing – with an Illustration from the EMS Industry**
  Christoph Karrer[1], Knut Alicke[2], Hans-Otto Guenther[1]
  [1]*Technical University of Berlin, Germany*
  [2]*Karlsruhe Institute of Technology, Germany*

**Reliability and Maintenance Engineering 4**

12/10/2009 11:00 - 12:30
Room: Luxembourg III

Chairs: Vahid Ebrahimipour
Yung-Chung Chen

Abstracts: see page 84

- **A Simple Approximation of the Weibull Renewal Function**
  Renyan Jiang[1]
  [1]*Changsha University of Science and Technology, China*

- **Cluster Analysis of Maintenance Management Problems**
  Renyan Jiang[1]
  [1]*Changsha University of Science and Technology, China*

- **Using Dynamic Bayesian Networks for Prognostic Modeling to Inform Maintenance Decision Making**
  Ken McNaught[1], Adam Zagorecki[1]
  [1]*Cranfield University, United Kingdom*

- **An Analysis of s-t Reliability for Wireless Networks Under Outage Conditions**
  Young C. Park[1]
  [1]*Baekseok University, South Korea*

- **A Hybrid Prognostics and Health Management Approach for Condition-Based Maintenance**
  Huiguo Zhang[1], Rui Kang[2], Michael Pecht[2]
  [1]*Beihang University, China*
  [2]*University of Maryland, United States*

- **Availability Assessment of Stochastic Multi-states Systems Based on UGF and Taking Into Account Data Uncertainty**
  Mazen El Falou[1], Eric Chatelet[1]
  [1]*Université de technologie de Troyes, France*

**Global Manufacturing and Management 1**

12/10/2009 13:30 - 15:00
Room: Luxembourg III

Chairs: Jun-Der Leu
Tritos Laosirihongthong

Abstracts: see page 85

- **Identifying Informal Communities and Leaders for Total Quality Management Using Network Analysis of Email**
  Junichiro Mori[1], Hisato Tashiro[1], Kazuo Haraoka[1], Katsumori Matsushima[1]
  [1]*The University of Tokyo, Japan*

- **Foreign Exchange Exposure-Based Strategy Building for Non-financial Corporations**
  Wen Song[1], Min-Hsiu Tsai[1], Junzo Watada[1]
  [1]*Waseda University, Japan*

- **TQM and Organizational Management Practices: Are They Really Complementary?**
  Prattana Punnakitikashem[1], Tritos Laosirihongthong[2], Dotun Adebanjo[3], Michael Mclean[4]
  [1]*Mahidol University, Thailand*
  [2]*Thammasat University, Thailand*
  [3]*University of Liverpool Management School, United Kingdom*
  [4]*Queensland University of Technology, Australia*

- **Global Supply Network Configuration Using Air-cargo Free Trade Zones: A Simulation-based Approach**
  Jun-Der Leu[1], Yu-Tsung Huang[1], Min-Hui Chen[1]
  [1]*National Central University, Taiwan*

- **An Integrated Product Development Platform Based on STEP and PDM**
  Wanling Chen[1], Shane Xie[1], Fenfang Zeng[2]
  [1]*University of Auckland, New Zealand*
  [2]*Huazhong University of Science and Technology, China*

- **Prominent Network Position: Value Creation and Value Protection**
  Ye Zhan[1], Xiaobo Wu[1], Ru-yan Hong[1]
  [1]*Zhejiang University, China*

**Global Manufacturing and Management 2**

12/10/2009 15:30 - 17:00
Room: Luxembourg III

Chairs: Shengquan (Shane) Xie
Prattana Punnakitikashem

Abstracts: see page 86

- **A Review of Theoretical Perspectives in Lean Manufacturing Implementation**
  Prattana Punnakitikashem[1], Nisakorn Somsuk[2], Dotun Adebanjo[3], Tritos Laosirihongthong[2]
  [1]*Mahidol University, Thailand*
  [2]*Thammasat University, Thailand*
  [3]*University of Liverpool Management School, United Kingdom*

- **House of Strategy: A Methodology of Strategy Deployment**
  Yaoguang Hu[1], Peng Su[1], Ruijun Zhang[2]
  [1]*Beijing Institute of Technology, China*
  [2]*Renmin University, China*

- **Conception Design and Empirical Research of Multinational Subsidiary's Entrepreneurial Orientation**
  Hui Zhang[1]
  [1]*Hangzhou Dianzi University, China*

- **Synergetic Mechanism between Firm's Technological Learning Mode and Technological Capability Evolution: A Case Study**
  Ru-yan Hong[1]
  [1]*Zhejiang University, China*

- **Outward Foreign Direct Investment Strategy and Technological Capabilities Accumulation: A Case Study**
  Xiaobo Wu[1], Wanling Ding[1], Yongjiang Shi[2]
  [1]*Zhejiang University, China*
  [2]*University of Cambridge, United Kingdom*

- **New Methodologies to Measure Product Technological Complexity for Manufacturing Optimization**
  Barbara Cimatti[1], Giovanni Tani[1]
  [1]*University of Bologna, Italy*

**Operations Research 4**

12/10/2009 11:00 - 12:30
Room: Montparnasse I

Chairs: Szu Hui Ng
Joaquin Sicilia-Rodriguez

Abstracts: see page 87

- **Customers Fuzzy Clustering and Catalog Segmentation In Customer Relationship Management**
  Mehdi fathi[1], Kamran kianfar[2], Amir hasanzadeh[3], Amir Sadeghi[4]
  [1]*Iran University of Science and Technology, Iran*
  [2]*Isfahan University of Technology, Iran*
  [3]*AmirKabir University of Technology, Iran*
  [4]*Tehran Payamenoor University, Iran*

- **A Variable Neighborhood Search Algorithm for Scheduling the Hot Rolling Operations at a Steel Mill**
  Kenneth Sörensen[1], Dirk Cattrysse[2]
  [1]*Universiteit Antwerpen, Belgium*
  [2]*Katholieke Universiteit Leuven, Belgium*

- **A Systematic Heuristic Rules Analysis Methodology for Routing Problems**
  Diego Crespo Pereira[1], David del Río Vilas[1], Juan Luis Crespo Mariño[1], Alejandro García del Valle[1]
  [1]*University of A Coruña, Spain*

- **Approximation Method for Performance Analysis of Three-Loop Closed Systems**
  Na Li[1], Zhibin Jiang[1], Jianwei Niu[2], Caihua Zhuang[1]
  [1]*Shanghai Jiaotong University, China*
  [2]*University of Science and Technology Beijing, China*

- **Catalog Segmentation with the Objective of Satisfying Customer Requirements in Minimum Number of Catalog**
  Kamran kianfar[1], Mehdi fathi[2], Amir hasanzadeh[3], Amir Sadeghi[4]
  [1]*Isfahan University of Technology, Iran*
  [2]*Iran University of Science and Technology, Iran*
  [3]*AmirKabir University of Technology, Iran*
  [4]*Tehran Payamenoor University, Iran*

**Service Innovation and Management 1**

12/10/2009 13:30 - 15:00
Room: Montparnasse I

Chairs: Xiang Zhang
Edwin K W Cheung

Abstracts: see page 88

- **The Relationship Among Information Technology, Innovation and Firm Performance －An Empirical Study of Business Services in SMEs**
  JrJung Lyu[1], Y. W. Yan[1], S. C. Li[1]
  [1]*National Cheng Kung University, Taiwan*

- **The Service Science Exploitation and Experimental Design on a City Level Innovation ： A Practice of Living Lab on Taipei City Intelligent Life Scheme**
  Hung Chih Lai[1], Y. S. Kuan[2], K. K. Hu[3]
  [1]*Shih Chien University, Taiwan*
  [2]*National Taiwan University, Taiwan*
  [3]*Chinese Management Association, Taiwan*

- **Service Offering, Perceived Value and Value Driver in Semiconductor Foundry Industry: An Exploratory Study**
  Chieh-min Chou[1]
  [1]*Feng Chia University, Taiwan*

- **Bibliometric Analysis of Service Science Research: Focus on Contribution from Asia**
  Kay Chuan Tan[1], Atarod Goudarzlou[1], Ayon Chakrabarty[1]
  [1]*National University of Singapore, Singapore*

- **Unbundled Network Elements: Global Experiences and Game Theoretical Analysis**
  Rui Dai[1], Shoulian Tang[1]
  [1]*Beijing University of Posts and Telecommunications, China*

- **Quality and Customer Satisfaction Spillovers in the Mobile Telecoms Industry**
  Yi Ding[1], Kah-Hin Chai[1]
  [1]*National University of Singapore, Singapore*

**Service Innovation and Management 2**

12/10/2009 15:30 - 17:00
Room: Montparnasse I

Chairs: Kay-Chuan Tan
Chen-Wo Kuo

Abstracts: see page 89

- **Developing a Scale of E-Service Quality for Blog**
  Yu-Lung Wu[1], Yu-Hui Tao[2], Pei-Chi Yang[1], Ching-Pu Li[1]
  [1]*I-Shou University, Taiwan*
  [2]*National University of Kaohsiung, Taiwan*

- **Multiple BPEL Execution Engines Based on Fragmentation Approach and Application of Service Process Models**
  Jing Bi[1], Zhiliang Zhu[1], Yushun Fan[2]
  [1]*Northeastern University, China*
  [2]*Tsinghua University, China*

- **Empirical Assessment of An Integrative Service Design Framework**
  Qi Zhou[1], Kay Chuan Tan[1]
  [1]*National University of Singapore, Singapore*

- **How Service Technology Innovation Impact Customer Acceptance of Automatic Transaction Machine**
  James K. C. Chen[1], Sin-Yi Lin[1], C.W. Hsiao[1]
  [1]*Asia University, Taiwan*

- **Research on the Planned Failure and Recovery in Airline Overbooking**
  Xiang Zhang[1], Jun Chen[1], Jin Huang[1], Huimin Wang[1], Yunhai Wang[1], Guoxin Wang[1]
  [1]*Beijing Institute of Technology, China*

- **Applying Multiple Linguistic PROMETHEE Method for Personnel Evaluation and Selection**
  Chen-Tung Chen[1], Yuan-Chu Hwang[1], Wei-Zhan Hung[2]
  [1]*National United University, Taiwan*
  [2]*National Chi Nan University, Taiwan*

## Quality Control and Management 4

12/10/2009 11:00 - 12:30
Room: Montparnasse II

Chairs: Shari Mohd Yusof
Zhang Wu

Abstracts: see page 90

- **A Product Platform Optimization Method Based on QFD**
  Xinggang Luo[1], Jiafu Tang[1], C.K. Kwong[2]
  [1]*Northeastern University, China*
  [2]*The Hong Kong Polytechnic University, China*

- **The Optimal Sample Sizes for the Xbar and CUSUM Charts**
  Mei Yang[1]
  [1]*Nanyang Technological University, Singapore*

- **The Impact of Costs of Quality: A Simulation Approach**
  Mohamed k. Omar[1], Sim Hock Kheng[2], Sharmeeni Murugan[1], Mohamad Razali[1]
  [1]*Technical University Malaysia, Malaysia*
  [2]*Multiumedia University, Malaysia*

- **Tolerance Design for Six Sigma Based on Life Cycle**
  Jianjun Wu[1], Y.Z Wang[2], J.J Shao[3], J.X Han[3]
  [1]*Tongji University, China*
  [2]*Jiangxi University of Science and Technoogy, China*
  [3]*Beijing Sunlight Tech. Ltd, China*

- **Combining the K-means and Decision Tree Methods to Promote Customer Value for the Automotive Maintenance Industry**
  Yi-Hui Liang[1]
  [1]*I-SHUO University, Taiwan*

- **Improving Service Quality Using Performance Indexes**
  Kee-Kuo Chen[1], Jaw-Shen Wang[2], Ching-Wu Chu[2], Rong-Her Chiu[2]
  [1]*Yu Da University, Taiwan*
  [2]*National Taiwan Ocean University, Taiwan*

## Quality Control and Management 5

12/10/2009 13:30 - 15:00
Room: Montparnasse II

Chairs: Ali Siadat
Kee-Kuo Chen

Abstracts: see page 91

- **Optimizing the Auto-brazing Process Quality via a Taguchi-neural Approach in Automotive Industry**
  H.L. Lin[1], Chang-Pin Chou[2]
  [1]*Army Academy R.O.C., Taiwan*
  [2]*National Chiao Tung University, Taiwan*

- **The Relationship Between Statistical Process Control Critical Success Factors and Performance: A Structural Equation Modeling Approach**
  Jafri Mohd Rohani[1], Sha'ri Mohd Yusof[1], Ismail Mohamad[1]
  [1]*Universiti Teknologi Malaysia, Malaysia*

- **Bayesian Fault Identification of Multistage Processes**
  Yanting Li[1], Fugee Tsung[2], Lifeng Xi[1]
  [1]*Shanghai Jiao Tong University, China*
  [2]*Hong Kong University of Science and Technology, China*

- **Quality Control of Architecutural Design Based on Uniform Technical Standards**
  Fan Chen[1], Jun Chen[1], Shutian Li[1]
  [1]*Zhejiang University, China*

- **Research on Assembly Quality Evaluation Based on Markov Chain**
  Jiping Lu[1], Shui-yuan Tang[1], Yan Yan[1], Faping Zhang[1], I Butt Shahid[2]
  [1]*Beijing Institute of Technology, China*
  [2]*National University of Sciences and Technology, Pakistan*

## Engineering Economy and Cost Analysis 1

12/10/2009 15:30 - 17:00
Room: Montparnasse II

Chairs: Antonio C. Fernandes
Gyutai Kim

Abstracts: see page 92

- **Parameter Estimation of Space-Time Model Using Genetic Algorithm**
  Siana Halim[1], Indriati N. Bisono[1], D. Sunyoto[1], I. Gendo[1]
  [1]*Petra Christian University, Indonesia*

- **Feature-Based System for Cost Estimation in Production Networks**
  Holger Duerr[1], Ngoc Anh Tran[1], Carsten Loeser[1]
  [1]*Chemnitz University of Technology, Germany*

- **A Comparative Study to Estimate Costs at Bombardier Aerospace Using Regression Analysis**
  Timothy Muia[1], Adil Salam[1], Nadia Bhuiyan[1]
  [1]*Concordia University, Canada*

- **Conformance Quality and Failure Costs in the Software Industry: An Empirical Analysis of Open Source Software**
  Lars Karg[1], Michael Grottke[2], Arne Beckhaus[1]
  [1]*SAP Research, Germany*
  [2]*University of Erlangen-Nuremberg, Germany*

- **The Management Impact on Value Added – An Approximate Measure**
  Antonio S. C. Fernandes[1]
  [1]*Technical University of Lisbon, Portugal*

- **Determine the Preference Ordering of the Stocks Listed in KOSPI with TOPSIS**
  Gyutai Kim[1], Sanghoon Cho[1], Suhee Jung[1]
  [1]*University of Chosun, South Korea*

**Supply Chain Management 4**

12/10/2009 11:00 - 12:30
Room: Montparnasse III

Chairs: Lu Chen
David Bennett

Abstracts: see page 93

- **Factor Analysis for Raising TMS Application**
  SunIl Oh[1], SungWoo Kang[1], Kwang Mo Yang[2], Kyung-Sik Kang[1]
  [1]*Myongji university, South Korea*
  [2]*Yuhan University, South Korea*

- **Petri-Net Based Modeling for Supply Chain Management: An Overview**
  Xiaoling Zhang[1], Qiang Lu[1], Teresa Wu[2]
  [1]*Harbin Institute of Technology, China*
  [2]*Arizona State University, United States*

- **Assessing Supply and Demand Chain Leagility According to Hooke's Law for a Single-agent Scenario**
  Egon Mueller[1], N. Nikoghosyan[2], Andreas Rutsch[2], Christian-Andreas Schumann[2]
  [1]*Chemnitz University of Technology, Germany*
  [2]*University of Applied Sciences Zwickau, Germany*

- **A Three Level Multi-Period Multi-Location and Multi-Crop Sustainable Supply Chain Model**
  Patricia Quadra[1], Justine Rodriguez[1], Marie Christianne Terol[1], Dennis Cruz[1]
  [1]*De La Salle University, Philippines*

- **Feed Logistics Management for a Vertically Integrated Swine Company**
  Suphakan Homkhampad[1], K Piewthongngam[1], S Pathumnakul[1]
  [1]*Khon Kaen University, Thailand*

- **The Influences of Fuzzy Demand Forecast on Bullwhip Effect in a Serial Supply Chain**
  Ying Xie[1]
  [1]*University of Greenwich, United Kingdom*

**Supply Chain Management 5**

12/10/2009 13:30 - 15:00
Room: Montparnasse III

Chairs: Andre Langevin
Susan Morton

Abstracts: see page 94

- **Factors Causing the Termination of the Relationship with Suppliers**
  Fethi Calisir[1], Cigdem Altin Gumussoy[1]
  [1]*Istanbul Technical University, Turkey*

- **Strategic Logistics Outsourcing: An Integrated QFD and AHP Approach**
  William Ho[1], David Bennett[1], KL Mak[2], Bing Chuah[3], Carman Ka Man Lee[4], Matthew Hall[1]
  [1]*Aston University, United Kingdom*
  [2]*The University of Hong Kong, Hong Kong*
  [3]*City Univeristy of Hong Kong, Hong Kong*
  [4]*Nanyang Technological University, Singapore*

- **Optimal Repositioning and Purchasing Policies in Returnable Container Managament**
  Afif Chandoul[1], Van-Dat Cung[1], Fabien Mangione[1]
  [1]*Grenoble INP, France, Metropolitan*

- **Identifying Vulnerabilities in the Supply Chain**
  Ana Paula Barroso[1], Virgínia Machado[1], Virgilio Cruz-Machado[1]
  [1]*FCT-UNL, Portugal*

- **Design and Development of a Knowledge Discovery System in Inventory Management**
  Catalin Mitrea[1], Carman Ka Man Lee[1]
  [1]*Nanyang Technological University, Singapore*

- **Using Compromised Method in Design of Reverse Logistics Network With Eco-Efficiency Consideration**
  Mehdi fathi[1], Amir hasanzadeh[2], Abbas Raad[2], Farzad Dehghanian[2], Saeed Mansour[2]
  [1]*Iran University of Science and Technology, Iran*
  [2]*AmirKabir University of Technology, Iran*

**Supply Chain Management 6**

12/10/2009 15:30 - 17:00
Room: Montparnasse III

Chairs: Nunzia Carbonara
Ana Paula Barroso

Abstracts: see page 95

- **New Tactics for Sharing Demand-Related Information to Implement Individual Demand Forecasting**
  Zhongjun Tang[1], Jing Xiao[1]
  [1]*Central South University, China*

- **The Role of Information Technology and Supply Chain Integration on Production Cost Performance**
  Sakun Boon-itt[1]
  [1]*Thammasat Business School, Thammasat University, Thailand*

- **A Genetic Algorithm Approach to Reducing the Bullwhip Effect by Investigating the Efficient and Responsive Strategy in Online Supply Chains**
  Jianping Lu[1], Paul Humphreys[1], Ronan McIvor[1], Liam Maguire[1]
  [1]*University of Ulster, United Kingdom*

- **A Closed-loop Supply Chain Planning Based on Adaptive Genetic Algorithm**
  Zhengying Cai[1], Hanwei Fang[2], Renbin Xiao[2], Rong Xin[1]
  [1]*Three Gorges University, China*
  [2]*Huazhong University of Science and Technology, China*

- **A Resilient Strategy for Meat-food Supply Chain Network Design**
  Yiping Jiang[1], Lindu Zhao[1], Shengnan sun[1]
  [1]*Southeast University, China*

- **A Systematical Approach to Improve Supply Chain: An Application of RFID Technology on Cargo Transportation**
  ChungEn Kao[1], Pi-Chuan Hung[2]
  [1]*Massachusetts Institute of Technology, United States*
  [2]*Industrial Technology Research Institute, Taiwan*

**Project Management 4**

12/10/2009 11:00 - 12:30
Room: Montparnasse IV

Chairs: Norbert Trautmann
Ofer Zwikael

Abstracts: see page 96

- **Towards Process Change Impact Analysis in Industrial Engineering**
  Stefan Häusler[1], Ralf Buschermöhle[1], Roland Koppe[1], Axel Hahn[2]
  [1]*OFFIS - Institute for Information Technology, Germany*
  [2]*University of Oldenburg, Germany*

- **A Task Group Based Multi-order Critical Chain Identification Algorithm**
  Qiong Liu[1], Na Liu[1], Saif Ullah[1]
  [1]*Huazhong University of Science and Technology, China*

- **Using Sliding Frame Approach for Scheduling Large and Complex Projects**
  Arik Sadeh[1], Yuval Cohen[2], Ofer Zwikael[3]
  [1]*Holon Institute of Technology, Israel*
  [2]*The Open University of Isarel, Israel*
  [3]*The Australian National University, Australia*

- **Ant Colony Algorithm for the Partner Selection Problem in a Complex Product System Project**
  Yongyi Shou[1], Chunjiang Song[1]
  [1]*Zhejiang University, China*

- **Managing Resource and Technology Interdependencies in Project Portfolio: A Case-Study Results**
  Mait Rungi[1]
  [1]*Lappeenranta University of Technology, Finland*

- **Research Frame for Incentive Mechanism of the Construction Agent in Government Investment Project: From the Perspective of Project Governance**
  Ling Yan[1], Linggang Yang[1], Hua Zhao[1]
  [1]*Tianjin University of Technology, China*

**Information Processing and Engineering 1**

12/10/2009 13:30 - 15:00
Room: Montparnasse IV

Chairs: Gary Chen
Zhongjun Tang

Abstracts: see page 97

- **Cost Estimation of Automotive Sheet Metal Components using Knowledge–Based Engineering and Case–Based Reasoning**
  Sachin Karadgi[1], Ulf Müller[1], Daniel Metz[1], Walter Schäfer[1], Manfred Grauer[1]
  [1]*Universität Siegen, Germany*

- **Semantic Association Search and Rank Method Based on Spreading Activation for the Semantic Web**
  Myungjin Lee[1], Wooju Kim[1]
  [1]*University of Yonsei, South Korea*

- **An Approach for Module Decomposition Based on Fuzzy Pattern Recognition**
  Yanqiu Xiao[1], Guofu Luo[2], Jun Ma[2], Li Hao[2], Houfang Sun[1]
  [1]*Beijing Institute of Technology, China*
  [2]*Zhengzhou University of Light Industry, China*

- **Checking Multi-agent Schedules with Temporal and Causal Information**
  Shieu-Hong Lin[1]
  [1]*Biola University, United States*

- **Exploration and Verification of Factors in the Front-end Stage of the ERP Implementation Process: Evidence from Case Study and Survey Research**
  Kun Shi[1], Qiang Lu[1]
  [1]*Harbin Institute of Technology, China*

**Information Processing and Engineering 2**

12/10/2009 15:30 - 17:00
Room: Montparnasse IV

Chairs: Shieu-Hong Lin
Maria Grazia Gnoni

Abstracts: see page 98

- **A New Method for Temperature Prediction and the TAIFEX Forecasting Based on Fuzzy Logical Relationship and Double Interval Division**
  Mohammad Hossein Fazel Zarandi[1], Ali Molla Davoudi[1], Maryam Haji Ali Beigi[1]
  [1]*Amirkabir University of Technology(Tehran Polytechnic), Iran*

- **Recommendation for Custom Product Via Probabilistic Relevance Model**
  Yue Wang[1], Mitchell Tseng[1]
  [1]*Hong Kong University of Science and Technology, Hong Kong*

- **Proposition of Two Multiple Criteria Models Applied to Dynamic Multi-objective Facility Layout Problem Based On Ant Colony Optimization**
  Gary Chen[1], Jamie Rogers[2]
  [1]*Chung Yuan Christian University, Taiwan*
  [2]*University of Texas at Arlington, United States*

- **Measuring Customer Innovativeness via FuzzyART Network Modeling**
  Yung-Hsin Chen[1], Shuo-Chang Tsai[1], Sheng-Tsung Hou[2], Long-Tai Chen[3]
  [1]*Asia University, Taiwan*
  [2]*Feng Chia University, Taiwan*
  [3]*Industrial Technology Research Institute, Taiwan*

- **Does Customer Satisfaction Affect the Quality, Trust – Loyalty Links in the Marketing Channel Context? – An Empirical Study on Taiwan Hypermarket**
  Yung-Hsin Chen[1], Shuo-Chang Tsai[1], Ya-Wen Yu[1], Ying-Ying Wang[2], Sheng-Hsiung Hsu[1]
  [1]*Asia University, Taiwan*
  [2]*National Yunlin University of Science and Technology, Taiwan*

- **Prioritizing Risks Based on Multicriteria Decision Aid Methodology: Development of Methods Applied to ALSTOM Power**
  Mafalda Figueiredo[1], Monica Oliveira[2]
  [1]*Alstom Power, Switzerland*
  [2]*Technical University of Lisbon, Portugal*

**Decision Analysis and Methods 2**

12/10/2009 11:00 - 12:30
Room: Montparnasse V

Chairs: Marc Wouters
Yu Cheng

Abstracts: see page 99

- **Maximum Loadability Limit of Power Systems Using Different Particle Swarm Optimization Techniques**
  Parimal Acharjee[1], A. Indira[1], Samit Mandal[1], S. S. Thakur[1]
  [1]*National Institute of Technology, India*

- **Snow Hydrology Studies in the Mountainous Eastern Part of Turkey**
  Reşat Acar[1], Serkan Şenocak[1], Selim Şengül[1]
  [1]*University of Atatürk, Turkey*

- **A Simulation Study of Prototyping for Risk Reduction in Product Customization**
  Songlin Chen[1], Youbang Zhang[1], Min Chen[1]
  [1]*Nanyang Technological University, Singapore*

- **Method to Evaluate the Profitability and Risk Structure of Projects in the Automotive Industry**
  Max von Bredow[1], Gunther Reinhart[1]
  [1]*Technische Universität München, Germany*

- **Get a Grip on Sense-Making and Exploration: Dealing with Complexity through Serious Play**
  Poul Kyvsgaard Hansen[1], Ade Mabogunje[2], Louise Moeller Haase[1]
  [1]*Aalborg University, Denmark*
  [2]*Stanford University, United States*

- **Measurement of Decision Maker's Performance in a Fuzzy Multi-attribute Decision Making**
  Arbaiy Nureize[1], Junzo Watada[1]
  [1]*Waseda University, Japan*

- **Performance Measurement Framework for Location Decisions on Supply Chain Design**
  Seyed Hessameddin zegordi[1], Amirhossein khosrojerdi[1], Seyed Sajed jamali[2]
  [1]*Tarbiat Modares University, Iran*
  [2]*Iran University of Science and Technology, Iran*

**Decision Analysis and Methods 3**

12/10/2009 13:30 - 15:00
Room: Montparnasse V

Chairs: Dong-Ling Xu
Sandor Bozoki

Abstracts: see page 100

- **Extending the PROMETHEE II Method to Continuous and Combinatorial Multi-objective Optimization Problems: A First Model**
  Yves De Smet[1], Bertrand Mareschal[1], Céline Verly[1]
  [1]*Université Libre de Bruxelles, Belgium*

- **Performance Evaluation of High-Performing IS Project Teams: An Analytic Network Process Approach**
  Eddie Cheng[1]
  [1]*Southern Cross University, Australia*

- **Competition Decision Models Between Supply Chains Under Linear Demand and Asymmetric Information**
  Baixun li[1], Yongwu Zhou[1], Bitao Peng[1]
  [1]*South China University of Technology, China*

- **Decision Dilemmas for Adaptation to Sea Level Rise: How to, when to?**
  Oz Sahin[1], Sherif Mohamed[1]
  [1]*Griffith University, Australia*

- **Valuation of R&D Investments for New Products: A Real Options Approach Focusing on Key Uncertainties**
  Marc Wouters[1], Berend Roorda[1], Ruud Gal[2]
  [1]*University of Twente, Netherlands*
  [2]*Philips Lighting, Netherlands*

- **Multi-period Allocation of Ambulances to Casualty Cluster in a Disaster Relief Operation with Uncertain Demand**
  Wenguo yang[1], Tiande guo[1], Tie liu[1], Jun huang[1]
  [1]*Graduate University of Chinese Academy of Science, China*

**Decision Analysis and Methods 4**

12/10/2009 15:30 - 17:00
Room: Montparnasse V

Chairs: Poul Kyvsgaard Hansen
Wenguo Yang

Abstracts: see page 101

- **Real-time Water Resource Allocation: Methodology and Mechanism**
  Xiaoya Li[1], Jinchuan Cui[1]
  [1]*Chinese Academy of Sciences, China*

- **Product Family Hierarchical Associated Design and Its Hierarchical Optimization**
  Gang Du[1], Jianzhong Wang[1]
  [1]*Tianjin University, China*

- **Visual PROMETHEE: Developments of the PROMETHEE & GAIA Multicriteria Decision Aid Methods**
  Bertrand Mareschal[1], Yves De Smet[1]
  [1]*Université Libre de Bruxelles, Belgium*

- **Liquid Crystal Display Technology Maturity Mapping Based on TRIZ**
  Zhi-Guang Li[1], Xiao-Quan Li[2], Runhua Tan[1]
  [1]*Hebei University of Technology, China*
  [2]*Tianjin Light Industry Design Institute, China*

- **Application of DEA for Selecting Most Efficient Information System Project with Imprecise Data**
  Soroosh Nalchigar[1], Seyed Mohammad Reza Nasserzadeh[1]
  [1]*University of Tehran, Iran*

- **Multiple-Fault Diagnosis Based on Binary Decision Diagram**
  Kan Yuan[1], Shousong Hu[1]
  [1]*Nanjing University of Aeronautics and Astronautics, China*

- **Application of Simulation in Designing a Secure Grid of Distributed Wireless Sensor Network**
  Dibyendu Chakrabarti[1]
  [1]*New Jersey Institute of Technology, United States*

**Poster Session 2**

12/10/2009 15:00 - 15:30
Room: Longchamps I & II

**Technology and Knowledge Management 7**

12/11/2009 09:00 - 10:30
Room: Luxembourg I

Chairs: Fernando Tadeo
Chien Chiang Lin

Abstracts: see page 107

- **Knowledge Management and Innovation: The Mediating Effects of Organizational Learning**
  Shu-Hsien Liao[1], Chi-Chuan Wu[1]
  [1]*Tamkang University, Taiwan*

- **Information Sharing Based on Social Network Construction Under Dynamic Alliance Environment: A Simulation Study**
  Xiaobo Wu[1], Wei Dou[1], Luxi Chen[1]
  [1]*Zhejiang University, China*

- **Customization Process Applied to the Design of Assistive Devices**
  Hung Bin Wang[1], Ding Bang Luh[1], Kuo Li Huang[2], Rain Chen[2]
  [1]*National Cheng Kung University, Taiwan*
  [2]*Southern Taiwan University, Taiwan*

- **Relationship between Knowledge Sharing and Absorptive Capacity Mediated by Organizational and Technology Factors: a Conceptual Model**
  Luciana Andrawina[1]
  [1]*Bandung Institute of Technology, Indonesia*

- **Knowledge Spillover of Core Human Intelligence in Industry Cluster**
  Hong Cai[1], Qili Lian[1], Qin Li[2]
  [1]*Huazhong University of Science and Technology, China*
  [2]*Zhengzhou University, China*

**Technology and Knowledge Management 8**

12/11/2009 11:00 - 12:30
Room: Luxembourg I

Chairs: Barbara Cimatti
Tomoko Saiki

Abstracts: see page 108

- **A Meta Analysis of the Innovation Issue:Based on the Technology Management Field**
  Shann-Bin Chang[1], Shu-Min Chang[2]
  [1]*Ling Tung University, Taiwan*
  [2]*Nan Kai University of Technology, Taiwan*

- **Applying Rough Set Theory in Evaluating the Competitiveness of Modern Service Industry in Guangdong Province**
  Wenjing Yu[1], Yuanbiao Zhang[1], Minglang Cui[1], Zhou Li[1]
  [1]*Jinan University, China*

- **Predict the Trend of Information Technology Knowledge Applied in Healthcare Management**
  Hong Feng Lai[1]
  [1]*National United University, Taiwan*

- **Research on Knowledge Fermenting in Product Innovation**
  Jingbin Hao[1], Robert E. Williams[1], Liang Fang[2], Renping Xu[3]
  [1]*University of Nebraska-Lincoln, United States*
  [2]*China University of Mining and Technology, China*
  [3]*Kunming University of Science and Technolgoy, China*

- **Exploring the Disruptive Nature of Disruptive Technology**
  Alan Pilkington[1]
  [1]*Royal Holloway, University of London, United Kingdom*

- **Roadmap from Technology to Industrialisation: The Case of South Africa**
  Michael Kachienga[1]
  [1]*University of Pretoria, South Africa*

**Production Planning and Control 4**

12/11/2009 09:00 - 10:30
Room: Luxembourg II

Chairs: Anil Varma
Joaquin Sicilia-Rodriguez

Abstracts: see page 109

- **Workload Control with Continuous Release**
  Bach Su Nguyen Phan[1], Martin Land[1], Gerard Gaalman[1]
  [1]*University of Groningen, Netherlands*

- **A Survey of Metal Working Companies' Readiness for Process Planning Performance Measurements**
  Staffan Anderberg[1], Tomas Beno[1], Lars Pejryd[1]
  [1]*University West, Sweden*

- **Combination of Genetic Algorithm and LP-metric to Solve Single Machine Bi-criteria Scheduling Problem**
  M.Bahador Aryanezhad[1], Armin Jabbarzadeh[1], Abalfazl Zareei[1]
  [1]*Iran University of Science and Technology, Iran*

- **A Methodology of Tool Lifecycle Management and Control Based on RFID**
  Guoxin Wang[1], Hidehito Nakajima[2], Yan Yan[1], Xiang Zhang[1], Lu Wang[1]
  [1]*Beijing Institute of Technology, China*
  [2]*Big Daishowa Seiki Co Ltd, Japan*

- **A Visual Cutting Tool Management Pattern for Flexible Manufacturing Systems**
  Guoxin Wang[1], Yan Yan[1], Hidehito Nakajima[2], Xiang Zhang[1], Hairui Li[1]
  [1]*Beijing Institute of Technology, China*
  [2]*Big Daishowa Seiki Co Ltd, Japan*

- **A GRASP Algorithm for the Two-Machine Flow-Shop Problem with Weighted Late Work Criterion and Common Due Date**
  Amir hasanzadeh[1], Hamid afshari[1], Kamran kianfar[2], Mehdi fathi[3], Afshin Oroojlooy Jadid[2]
  [1]*AmirKabir University of Technology, Iran*
  [2]*Isfahan University of Technology, Iran*
  [3]*Iran University of Science and Technology, Iran*

**Production Planning and Control 5**

12/11/2009 11:00 - 12:30
Room: Luxembourg II

Chairs: Renzo Akkerman
Timo Knuutila

Abstracts: see page 110

- **Preference-based Adaptive Genetic Algorithm for Multiobjective Advanced Planning and Scheduling Problem**
  Junyu Yang[1], Wencheng Tang[1]
  [1]*Southeast University, China*

- **Multi-conditioned and Capacitated Production Planning Model for Remanufacturing System**
  Liu Guangfu[1], Yang Xiaowen[1]
  [1]*Tongji University, China*

- **Scheduling With Uncertain Processing Times: Applying β-Robust Schedule On Two-Machine Flow-Shop With Constraints**
  Saif Ullah[1], Qiong Liu[1], Chaoyong Zhang[1], Yasser Awan[1]
  [1]*Huazhong University of Science and Technology, China*

- **A Closed-Loop Approach to Continuous Process Scheduling**
  Christoph Schwindt[1], Sascha Herrmann[2], Hanno Sagebiel[1]
  [1]*Clausthal University of Technology, Germany*
  [2]*Fraunhofer Gesellschaft, Germany*

- **Joint Economic Lot Size Model with Quality Improvement for A Single Supplier and A Single Buyer Cooperative Collaboration**
  Docki Saraswati[1], Andi Cakravastia[2], Bermawi P. Iskandar[2], Abdul Hakim Halim[2]
  [1]*Universitas Trisakti, Indonesia*
  [2]*Institut Teknologi Bandung, Indonesia*

**Facilities Planning and Management 1**

12/11/2009 09:00 - 10:30
Room: Luxembourg III

Chairs: Wooseung Jang
Ziqi Liao

Abstracts: see page 111

- **Hub Arc Selection for Freight Consolidation**
  Sean Carr[1], Wooseung Jang[2]
  [1]*North Carolina State University, United States*
  [2]*University of Missouri, United States*

- **A Study on Fuzzy Decision of Facility Management Outsourcing Based on SWOT Analysis**
  Ji-ming Cao[1], Qian Li[1]
  [1]*Tongji University, China*

- **Planning Block Widths for Storage Yards of Container Terminals with Parallel Blocks**
  Jörg Wiese[1]
  [1]*University of Paderborn, Germany*

- **Scheduling of Stabilization Surgical Cares in Case of a Disaster**
  Issam Nouaouri[1], J-Christophe Nicolas[1], Daniel Jolly[1]
  [1]*Université d'Artois, France*

- **A Cost-Based Set-Covering Location-Allocation Problem with Unknown Covering Radius**
  Mahdi Bashiri[1], Fateme Fotuhi[1]
  [1]*Shahed University, Iran*

- **A Study on Competitive Location of Express Operation Station**
  Changjun Xu[1], Dacheng Liu[1], Zhingfang Lu[1], Jianhua Jiang[1], Xin Zheng[1], Shan Huang[1]
  [1]*Tsinghua University, China*

**Engineering Education and Training 1**

12/11/2009 11:00 - 12:30
Room: Luxembourg III

Chairs: Frode Eika Sandnes
Fu-Man Hsieh

Abstracts: see page 112

- **The Influence of Transformational Leadership and Support for Innovation on Organizational Innovation: from the Vocational High School Teachers' Perspective**
  Hsi-Chi Hsiao[1], Jen-Chia Chang[2], Ya-Ling Tu[3]
  [1]*Cheng Shiu University, Taiwan*
  [2]*National Taipei University of Technology, Taiwan*
  [3]*National Changhua University of Education, Taiwan*

- **IE Student Education in China and Its Development**
  Yu yang[1], Xuedong Liang[1], Geroge L Smith[2], Jing wang[1], Xiaolei Wang[1]
  [1]*Chongqing University, China*
  [2]*Institute of Industrial Engineers, United States*

- **Factors Affecting Faculty Members' Integration of Electronic Communication in Teaching**
  Murat Durucu[1], Fethi Calisir[1]
  [1]*Istanbul Technical University, Turkey*

- **Students' Experiences of Supervision in Doctoral Education in Industrial Engineering and Management**
  Katja Lahenius[1], Miia Martinsuo[2]
  [1]*Helsinki University of Technology, Finland*
  [2]*Tampere University of Technology, Finland*

- **Developing On-the-job Training Program for the Occupational Safety and Health Personnel in Nanotechnology Industries**
  Fu-man Hsieh[1], Perng-Jy Tsai[2], Wang-Yi Chen[3], Chen-Ping Chang[3]
  [1]*Wen-tzao Ursuline College, Taiwan*
  [2]*Department of Environmental and Occupational Health, National Cheng Kung University, Taiwan*
  [3]*Institute of Occupational Safety and Health, Taiwan*

**Human Factors 1**

12/11/2009 09:00 - 10:30
Room: Montparnasse I

Chairs: Rammohan Maikala
Yiren Dong

Abstracts: see page 113

- **The Expansion of the Partial Differential Equations Models of the ABR System and the Condition of the Communication Process**
  Masahiro Aruga[1], Aritho Endo[2], Kiyotaka Takagi[1], Hiroshi Tanaka[2]
  [1]*Tokai University, Japan*
  [2]*Tokyo Medical and Dental University, Japan*

- **Usability and Functionality: A Comparison of Project Managers' and Potential Users' Evaluations**
  Ayse Elvan Bayraktaroglu[1], Fethi Calisir[1], Cigdem Altin Gumussoy[1]
  [1]*Istanbul Technical University, Turkey*

- **The Success of the South African Construction Industry in the International Market: Is Diversity an Issue?**
  Jose Miranda[1], Marie-Louise Barry[1]
  [1]*University of Pretoria, South Africa*

- **A Pre-alarm System for Visual Fatigue in an IC Packaging Factory**
  Jhih-Tsong Lin[1], Guo-Feng Liang[1], Sheue-Ling Hwang[1], Eric Min-yang Wang[1]
  [1]*National Tsing Hua University, Taiwan*

- **An Assessment of a Workload Predictive Model in Manual Materials Handling Tasks**
  Kai-Way Li[1], Shang Wei Tseng[1], Rui-feng Yu[2]
  [1]*Chung-Hua University, Taiwan*
  [2]*Tsinghua University, China*

- **Determination of Maximum Acceptable Weight of Handling in Combined Manual Materials Handling Tasks**
  Kai-Way Li[1], Chih Fang Liu[1]
  [1]*Chung-Hua University, Taiwan*

**Human Factors 2**

12/11/2009 11:00 - 12:30
Room: Montparnasse I

Chairs: Masahiro Aruga
Ravindra Goonetilleke

Abstracts: see page 114

- **Ergonomics Solutions for Improving Surgery Performance of Interlocking Intramedullary Nails**
  Shaolong Kuang[1], Tianmiao Wang[1], Lei Hu[1], Wenyong Liu[1], Junqiang Wang[2]
  [1]*Beihang University, China*
  [2]*Jishuitan Hospital, China*

- **Role of Floor Frictional Characteristics and Gender on Psychophysiological Responses During Dynamic Pushing**
  Rammohan Maikala[1], Vincent Ciriello[1], Patrick Dempsey[1], Niall O'Brien[1]
  [1]*Liberty Mutual Research Institute for Safety, United States*

- **Crew Resource Management Training for Improving Team Performance of Operators in Korean Advanced Nuclear Power Plant**
  Sa-Kil Kim[1], Je-Yun Park[1], Seong Nam Byun[2]
  [1]*Koera Atomic Energy Research Institute, South Korea*
  [2]*Kyung Hee University, South Korea*

- **An Affective-Cognitive Framework of Product Ecosystem Design**
  Feng Zhou[1], Roger Jiao[2], Qianli Xu[1], Songlin Chen[1], Xingda Qu[1], Martin Helander[1]
  [1]*Nanyang Technological University, Singapore*
  [2]*Georgia Institute of Technology, United States*

- **A Research on the Mechanism of Leveraging Innovation Capabilities Via Entrepreneurs in SMEs**
  Suping Zhang[1], Qingrui Xu[1]
  [1]*Zhejiang University, China*

- **Adaptability of Reward System for Knowledge-Based Competition**
  Shujuan Zhang[1], Wei Shi[1], Xuan Wang[1], G.Q. Liang[1]
  [1]*North-western Polytechnical University, China*

**Systems Modeling and Simulation 1**

12/11/2009 09:00 - 10:30
Room: Montparnasse II

Chairs: Egon Mueller
Adam Ng

Abstracts: see page 115

- **Decision Making for Interactive Optimization of Correlated Desirability Functions**
  Mahdi Bashiri[1], Ali Salmasnia[1]
  [1]*Shahed University, Iran*

- **A Design Process for Texture Segmentation**
  Hee Kooi Khoo[1], Hong Choon Ong[1]
  [1]*Universiti Sains Malaysia, Malaysia*

- **An Automated Approach for Identification and Resolution of Spatial Clashes in Building Design**
  Andreas Radke[1], Toste Wallmark[2], Mitchell Tseng[1]
  [1]*Hong Kong University of Science and Technology, Hong Kong*
  [2]*Tecton Limited, Hong Kong*

- **Integrating Human Behaviour into Factory Simulation - A Feasibility Study**
  Ralph Riedel[1], Egon Mueller[1], Ruediger von der Weth[2], Noah Pflugradt[1]
  [1]*Chemnitz University of Technology, Germany*
  [2]*University of Applied Sciences Dresden, Germany*

- **Design of Experiments for Simulation Models with Stochastic Constraints**
  Shi Mu[1], Jun Yin[1], Jun Yuan[1], Szu Hui Ng[1]
  [1]*National University of Singapore, Singapore*

- **Intelligent Agents Behavior in the Queueing Process: Integrating Cellular Automata & Genetic Algorithms**
  Karthik Sankaranarayanan[1], Erik R Larsen[1], Ann Van Ackere[2]
  [1]*University of Lugano, Switzerland*
  [2]*University of Lausanne, Switzerland*

**Systems Modeling and Simulation 2**

12/11/2009 11:00 - 12:30
Room: Montparnasse II

Chairs: Thong Ngee Goh
Ralph Riedel

Abstracts: see page 116

- **Creating a Simulation Environment for Critical Infrastructure Interdependencies Study**
  Irene Eusgeld[1], Cen Nan[1]
  [1]*Swiss Federal University of Technology Zurich, Switzerland*

- **Optimizing Wheat Storage and Transportation System Using a Mixed Integer Programming Model and Genetic Algorithm: A Case Study**
  Reza Zanjirani Farahani[1], Nasrin Asgari[1], Hossein Hojabri[2], Amir Ardestani Jaafari[2]
  [1]*National University of Singapore, Singapore*
  [2]*Amirkabir University of Technology, Iran*

- **System Dynamics Simulation and Optimization with Fuzzy Logic**
  Adam T.S. Ng[1], Muhammad Iqbal Bin Khirudeen[1], Tony Halim[2], Sie Yong Chia[2]
  [1]*National University of Singapore, Singapore*
  [2]*Temasek Polytechnic, Singapore*

- **Chaotic vs. Random Coverage Missions**
  Felix Hackbarth[1]
  [1]*Hamburg University of Technology, Germany*

- **Global Bifurcations for a Rotor-Active Magnetic Bearings System**
  Hongzhi Tong[1], Fenghong Yang[2], Lihua Chen[3]
  [1]*University of International Business and Economics, China*
  [2]*Central University of Finance and Economics, China*
  [3]*Beijing University of Technology, China*

- **Intelligence and Impact Contests in Defending a Single Object with Imperfect False Targets**
  Rui Peng[1], Gregory Levitin[2], Min Xie[1], Szu Hui Ng[1]
  [1]*National University of Singapore, Singapore*
  [2]*The Israel Electric Corporation Ltd., Israel*

**Safety, Security and Risk Management 1**

12/11/2009 09:00 - 10:30
Room: Montparnasse III

Chairs: Assed Haddad
Min Wang

Abstracts: see page 117

- **Developing a Scale Measurement of Market Uncertainty: A Cluster Analysis on Taiwan's Financial Services**
  Shu-Hsien Liao[1], Wen-Jung Chang[1], Da Chian Hu[1], Yi-Wen Lin[1]
  [1]*Tamkang University, Taiwan*

- **Risk Simulation for Residential Development: A Case Study for an Uncertain Market in South Africa**
  Leon Pretorius[1], Changhua Li[2]
  [1]*University of Pretoria, South Africa*
  [2]*Hefei University, China*

- **Stock Indices Analysis Based on ARMA-GARCH Model**
  Weiqiang Wang[1], Ying Guo[1], Zhendong Niu[1], Yujuan Cao[1]
  [1]*Beijing Institute of Technology, China*

- **Case-based HFACS for Collecting, Classifying and Analyzing Human Errors in Marine Accidents**
  Yongtao Xi[1], Quangen Fang[1], Weijiong Chen[2], Shenping Hu[1]
  [1]*Shanghai Maritime University, China*
  [2]*Library of Shanghai Maritime University, China*

- **Cultural Backgrounds of Employees' Safety Behaviors: Coding and Cluster Analysis on Participant Observation**
  Qi Zhang[1], Guangtao Yu[2], Erping Wang[1]
  [1]*Research Institute, China*
  [2]*University, China*

- **A Comparison of Friction Measurement Results Using Two Slipmeters**
  Kai-Way Li[1], Ching-Sui Hung[1]
  [1]*Chung-Hua University, Taiwan*

**Safety, Security and Risk Management 2**

12/11/2009 11:00 - 12:30
Room: Montparnasse III

Chairs: Leon Pretorius
Qingpei Hu

Abstracts: see page 118

- **Reviving Knowledge and Preventing Accidents in Process Industries**
  Patrizia Agnello[1], Silvia Ansaldi[1], Paolo Bragatto[1], Paolo Pittiglio[1]
  [1]*ISPESL Nat.Inst.Prevention & Safety at Work, Italy*

- **Quantitative Risk Analysis Applied to the Gases Industry**
  Assed Haddad[1], Thaisa Sá[1], Erick Galante[2]
  [1]*Federal University of Rio de Janeiro, Brazil*
  [2]*Brazilian Army, Brazil*

- **On the Anatomy of Operational Risk**
  Amerigo Silvestri[1], Enrico Cagno[1], Paolo Trucco[1]
  [1]*Politecnico Di Milano, Italy*

- **Safety Culture in Petrochemical Companies in Brazil**
  Anastacio Pinto Goncalves Filho[1], Jose Celio Silveira Andrade[2], Marcia Mara Oliveira Marinho[2]
  [1]*Ministry of Labour and Employment, Brazil*
  [2]*Bahia Federal Universtiy, Brazil*

- **STARTS: A Decision Support Architecture for Dynamic Security Configuration Management**
  Anand Singh[1], David Lilja[1]
  [1]*University of Minnesota, United States*

- **Application of Formal Safety Assessment Methodology on Traffic Risks in Coastal Waters & Harbors of Fujian Province**
  Jinpeng Zhang[1], Shenping Hu[1]
  [1]*Shanghai Maritime University, China*

**E-Business and E-Commerce 1**

12/11/2009 09:00 - 10:30
Room: Montparnasse IV

Chairs: Lisheng Wang
Ilias Santouridis

Abstracts: see page 119

- **Robust Segmentation for the Service Industry Using Kernel Induced Fuzzy Clustering Techniques**
  Chih Wang[1]
  [1]*National Chung Hsing University, Taiwan*

- **Research on the Relationship Between Customer Value of E-business and Customer Retention: An Empirical in China**
  Guozheng Zhang[1], Xiaohong Chen[1], Faming Zhou[2]
  [1]*Central South University, China*
  [2]*Hunan Agricultural University, China*

- **The Relationships among Brand Image, Brand Trust, and Online Word-of-Mouth: an Example of Online Gaming**
  Shu-Hsien Liao[1], Yu-Chun Chung[1], R. Widowati[1]
  [1]*Tamkang University, Taiwan*

- **Analysis of Capacity-Constrained Sequential Auctions in Duopoly Market Environment**
  Z. Zhang[1], Mingzhou Jin[1]
  [1]*Mississippi State University, United States*

- **Analysis of Interoperability Value Proposition in the Architectural, Engineering and Construction Sector**
  Antonio Grilo[1], Ricardo Jardim-Goncalves[1], Virgilio Cruz-Machado[1]
  [1]*FCT-UNL, Portugal*

- **The Relationship Between ERP Software Selection Criteria and ERP Success**
  Wen-Hsien Tsai[1], Pei-Ling Lee[1], Yu-Shan Shen[1], Ching-Chien Yang[2]
  [1]*National Central University, Taiwan*
  [2]*ChungChou Institute of Technology, Taiwan*

**E-Business and E-Commerce 2**

12/11/2009 11:00 - 12:30
Room: Montparnasse IV

Chairs: Chih Wang
Antonio Grilo

Abstracts: see page 120

- **Investigating the Mediation Effect of Satisfaction on the Service Quality and Customer Loyalty Link: Empirical Evidence from Greek Customers of Internet Shops**
  Ilias Santouridis[1], Panagiotis Trivellas[1]
  [1]*Technological Education Institute of Larissa, Greece*

- **An Empirical Study of the Effect of Customer Satisfaction and Its Two Dimensions on Online Customer Loyalty**
  Qing-hua Zhai[1], Ming-hai Ye[1]
  [1]*Tongji University, China*

- **Online Customization for Apparel: the Roles of Involvement and Innovativeness**
  Yun Wang[1], Chenyin liu[2]
  [1]*National Pingtung University of Science and Technology, Taiwan*
  [2]*I-Shou University, Taiwan*

- **Examining the Factors Associated with Consumer's Trust in the Context of Business-to-Consumer E-Commerce**
  Kim Dung Phung[1], Kuei-Ling Yen[2], Ming- Hsiung Hsiao[1]
  [1]*Shu-Te University, Taiwan*
  [2]*National Sun Yat-sen University, Taiwan*

- **An Empirical Research on the Relationship between Perceived Customer Value and E-loyalty**
  Lisheng Wang[1], Shao-bo Sun[1], Jinxiang Zha[2]
  [1]*Shandong University, China*
  [2]*Zhejiang University, China*

**Decision Analysis and Methods 5**

12/11/2009 09:00 - 10:30
Room: Montparnasse V

Chairs: Bertrand Mareschal
Huan-Min Xu

Abstracts: see page 121

- **Application of Multiple Criteria Decision Analysis in Impact Assessment of Carbon Labelling**
  Dong-Ling Xu[1]
  [1]*The University of Manchester, United Kingdom*

- **Incomplete Pairwise Comparison Matrices in Multi-Attribute Decision Making**
  Sándor Bozóki[1], János Fülöp[1], Lajos Rónyai[1]
  [1]*MTA SZTAKI, Hungary*

- **A Decision Making Software for End-of-Life Vehicle Disassemblability and Recyclability Analysis**
  Feri Afrinaldi[1], Muhamad Zameri Mat Saman[2], Awaluddin Mohamed Shaharoun[2]
  [1]*Andalas University, Indonesia*
  [2]*Universiti Teknologi Malaysia, Malaysia*

- **Architectural Design Proposals Selection Based on Fuzzy Analytic Hierarchy Process**
  Hao Qin[1], Fan Chen[1], Pingying Lin[1], Shutian Li[1]
  [1]*Zhejiang University, China*

- **A General Fuzzy TOPSIS Based on New Fuzzy Positive and Negative Ideal Solution**
  Nikbakhsh Javadian[1], Mohammad Kazemi[1], Fahime Khaksar-Haghani[1], Mehdi Amiri-Aref[1], Reza Kia[2]
  [1]*Mazandaran University of Science and Technology, Iran*
  [2]*Islamic Azad University, Iran*

- **On Non-Existence of Nash Equilibrium of M Person Game with Pure Strategy for Delivery Services**
  Kazuki Takahashi[1], Ushio Sumita[2]
  [1]*Tokyo Gas Co., Ltd., Japan*
  [2]*University of Tsukuba, Japan*

**Decision Analysis and Methods 6**

12/11/2009 11:00 - 12:30
Room: Montparnasse V

Chairs: Malick Ndiaye
Soroosh Nalchigar

Abstracts: see page 122

- **A New Decision Making Approach for Optimization of Multiple Response Problem**
  Mahdi Bashiri[1], Majid Ramezani[1]
  [1]*Shahed University, Iran*

- **Customer Behaviour Modelling in the Maximum Capture Model**
  Malick Ndiaye[1]
  [1]*King Fahd University of Petroleum and Minerals, Saudi Arabia*

- **Concurrent-based Analysis Model of Product Development Flow Combining Forward with Backward Chain**
  Huan-Min Xu[1], Ming-Hai Yuan[1], Ai-Min Ji[1], Da-Peng Wei[1]
  [1]*HoHai university, China*

- **Cost-Benefit Analysis and Public Project Decision**
  Xizhen Gao[1], Yu Li[2]
  [1]*TianJin University, China*
  [2]*TianJin University of Technology, China*

- **Competitiveness Factor Analysis of Public Traffic in Hebei Province**
  Hui Sun[1], Zhengxu Ren[1], Zhiqing Fan[1], Ye Shi[1]
  [1]*Tianjin University, China*

- **Design of a Decision Support System for Selecting ultimodal Transportation route: An Integrated Model Using AHP and ZOGP Case study Thailand–Vietnam**
  Warapoj Meethom[1], Athkorn kengpol[1]
  [1]*King Mongkut's University of Technology North Bangkok, Thailand*

**Poster Session 3**

12/11/2009 10:30 - 11:00
Room: Longchamps I & II

# Abstracts

| | |
|---|---|
| **Session** | Technology and Knowledge Management 1 |
| **Date** | 12/9/2009 |
| **Time** | 11:00 - 12:30 |
| **Room** | Luxembourg I |
| **Chairs** | Chui Young Yoon, Yuya Kajikawa |

**Designing a Key Performance Indicator System for Technological Innovation Audit at Firm's Level: A Framework and an Empirical Study**

Hai-Ao Zheng[1], Jean-Jacques Chanaron[2], Jianxin You[1], Xiao-li Chen[3]
[1]*Chinese Academy of S&T Management, China*
[2]*Grenoble Ecole de Management, France*
[3]*Chemnitz University of Technology, Germany*

This research aims at making a step further in building a methodology framework of innovation performance audit. With adopting the ideology of performance measurement system, a framework of key performance indicator(KPI) system including three level issues of 'what is input', 'what is done' and 'what happens' is designed for technological innovation audit, which can reflect the performance of technological innovation at firm's level comprehensively. And then, a questionnaire survey on line is conducted to test the validity of the key performance indicator system. Based on data analysis, the KPI system is proved to be effective as a whole, of which most indicators not only are important, but also could be measured easily in firms. Finally, in-depth innovation performance audit of four hi-tech firms is taken as a case study to verify the validity of the KPI system.

**Assessing the Development Phase of Emerging Technology: The Wood Pellets Case**

Aija Tapaninen[1], Marko Seppänen[1]
[1]*Tampere University of Technology, Finland*

Climate change has highlighted the potential for bioheating solutions, including wood pellet technologies. This study investigates the development phase of an emerging technology regarding wood pellets that is assessed through publishing activity in different sources. The results show that the number of publications has increased significantly in the 21st century. This indicates the accelerating increase in the of the current technology.

**Strategic Management of Technology Objectives in Enterprise Practice - A Conceptual Framework**

Kari Sahlman[1], Harri Haapasalo[2]
[1]*Nokia Siemens Networks, Finland*
[2]*University of Oulu, Finland*

Rapid changes in economical environment and in technology induce major challenges for companies to strategically manage their technological capabilities for sustained competitiveness. Field of strategic management of technology is exceptionally complex, and there exist no commonly agreed frameworks or established practices. In this paper is presented the objectives elements of strategic management of technology in a conceptual framework. The framework content is based on enterprise practice, and its theoretical model is derived from integrated management theory. The classified objectives elements comply with conceptions on strategic management and reflect the need of continuous transformation of company's offering and business models in a fiercely competitive environment. The framework with its elements classification provides structure and clarity, and it is useful for constructing strategic management of technology practices in enterprises. The framework is also suggested to provide frame of reference for scholars for further elaboration.

**How Popular am I outside my own Community: a Mixed Regression model for mapping Technological Innovation in the US Green Energy Sector**

Piyasi Choudhury[1], Hosein Fallah[1]
[1]*Stevens Institute of Technology, United States*

While patent citations provide a powerful way of identifying the process of knowledge transfer, the question is: are future citations by patents within the same community better drivers of knowledge flow than patent citations from a different community? In this paper, the authors present a mixed regression model to study the differential effect of these two classes of patent citations as a motivating factor for future innovations. The study involves analysis of patents within the green energy sector in the US during the timeframe 1976 to 2008. The empirical results suggest that there is a positive relationship between both of these classes of citations and the creation of new patents. Furthermore, it shows that the citations from a different community would be a better driving factor behind new innovations than citations from within the same community.

**A Technology Tree Based VND model for Identifying the Top Technologies in the US Renewable Energy Industry**

Piyasi Choudhury[1], Hosein Fallah[1]
[1]*Stevens Institute of Technology, United States*

This paper examines the technology trajectory evolution of the green energy industry in the US. In particular, it identifies the top three communities within this sector and summarizes their growth patterns. We analyzed the US green energy patents from 1980-2005 and proposed a "green technology tree", the structure of which symbolizes the growth pattern of the core green technologies. Based on this tree, we designed the VND model that divides these top green energy communities into three separate categories: the "Veteran" category representing patent classes that have been in prominence from the initial days of green revolution, the "Newbie" category that focuses on the recently evolving green technologies and finally, the "Downgraded" category which is a representative of the once-popular-now-disappearing technologies.

**The Influence of Export Experience and Export Information Use on Export Knowledge and Performance**

Ali Hajiha[1], Leila Zamani[1], Hamid Reza Saeednia[1]
[1]*Islamic Azad University, Iran*

The objective of this study is to test empirical relationships between export experience, export market information use, export knowledge, and export performance. In this respect we have developed a model that was presented before by Toften (2005). To test the model we collected data from 220 top factory managers/owners of Iranian dried fruit industry, mainly consisting of a number of small and medium-sized firms with a strong export dependency and for confirmatory factor analysis, LISREL 8.50 was used. The findings indicate that export experience positively affects both "instrumental/conceptual" use of information and export knowledge but doesn't affect export performance. "Instrumental/conceptual" use of information also is found to positively affect both export knowledge and export performance. Export knowledge is found to have direct influence on export performance in this study.

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|---|---|
| **Session** | Technology and Knowledge Management 2 |
| **Date** | 12/9/2009 |
| **Time** | 13:30 - 15:00 |
| **Room** | Luxembourg I |
| **Chairs** | Jae-Yong Choung, Alan Pilkington |

**Innovative Capabilities, Entrepreneurial Process and the Dynamic Growth of University Spin-outs: A Process-Oriented Study with Evidence from China**
Yuan Zhou[1], Tim Minshall[1], Xiyang He[1], Charles Hampden-Turner[1]
[1]*University of Cambridge, United Kingdom*

This research aims to develop a conceptual framework in order to enquire into the dynamic growth process of University Spin-outs (USOs) in China. This study attempts to address how do USOs in China build and configure the innovative capabilities to cope with the dynamic growth. This paper aims to contribute to the existing literature by understanding the USOs' dynamic entrepreneurial process, when investigating the interconnections between innovation problem-solving and the required configuration of innovative capabilities (esp. integrative) in four growth phases. To date, studies that have investigated the connection of dynamic development process of USOs in China and the required capabilities still remain sparse. Addressing this research gap will be of great interest to entrepreneurs, policy makers, and venture investors.

**Strategic Technology Alliance and Rapid Accumulation of Technological Capabilities in Emerging Economies**
Hao-Jun Zhou[1], Dong Wu[1], Xiaobo Wu[1], Xinmin Peng[1]
[1]*Zhejiang University, China*

This paper examined strategic technology alliance from the perspective of technological catching-up in emerging economies. We developed a conceptual model for describing the phenomenon that strategic technology alliance can effectively improve the absorptive capacity for firms in emerging economies. We used a case study of housing industrialization strategic technology alliance in China to explore the causal relationships between variables in this model. We found that through the mechanisms of technology outsourcing and knowledge sharing strategic technology alliance may effectively improve the absorptive capacity of the firms as a whole. By building up strategic technology alliance, it is possible for firms in the emerging economies to overcome the obstacle that individual firm can not effectively acquire and internalize the advanced technology in developed economies due to their lack of absorptive capacity.

**Knowledge Sharing in an Electronics Manufacturing Firm: Evidence from Malaysia**
Nurliza Mohammed Fathi[1], Uchenna Eze[1], Gerald Guan Gan Goh[1]
[1]*Multimedia University, Malaysia*

The objective of this paper is to determine the knowledge sharing behavioral intentions among employees. We developed nine hypotheses on the behavioral intentions of employees with respect to sharing knowledge, which are grounded on theory. In addition, we used 141 valid survey responses from an electronics manufacturing firm in Malaysia and analyzed the data using correlation and regression statistical techniques. The findings in this paper could help provide some materials that managers could use to improve knowledge sharing capacity in a manufacturing firm, which may be useful in related areas such as product life cycle, new product development and customer services. Managers could also use the results to seek for avenues to encourage knowledge sharing among employees in the firm. This paper contributes to the existing body of literature on knowledge sharing. The findings and explanation for the hypotheses are discussed including the implications for research, practice and suggestion for future research.

**Factors Affecting Intention to Quit among IT Professionals**
Fethi Calisir[1], Cigdem Altin Gumussoy[1], Ibrahim Iskin[2]
[1]*Istanbul Technical University, Turkey*
[2]*Portland State University, United States*

Turnover among information technology (IT) professionals still remains a challenge for many companies. IT professionals suffer from high stress levels. This, in turn, may lead to burnout and result in quitting their jobs. Knowing the factors that affect the quitting decision of IT professionals is important for companies to decrease the turnover rate of qualified employees. To this end, this study conducted a survey to investigate the impact of stressors, job stress, organizational commitment, locus of control and job satisfaction on intention to quit among IT professionals in Turkey. A total of 204 questionnaires were collected from IT professionals. The results show that job satisfaction is explained by stressors and locus of control, whereas the effect of job stress on job satisfaction is found to be insignificant. Additionally, both organizational commitment and job satisfaction predict intention to quit. The paper concludes with discussion and recommendations for future research.

**Early Detection of Innovations from Citation Networks**
Naoki Shibata[1], Yuy Kajikawa[1], Yoshiyuki Takeda[2], Ichiro Sakata[1], Katsumori Matsushima[1]
[1]*The University of Tokyo, Japan*
[2]*Chiba Institute of Technology, Japan*

In this paper, we performed a comparative study in two research domains to develop a method of early detection of seeds of innovations. We divided the papers in each research domain into clusters using the topological clustering method, tracked the evolution of the clusters and the positions of the papers in each cluster, and visualized citation networks with cluster name for each cluster. And we also investigated the correlation between future times cited and three measures of centrality, i.e., clustering centrality, closeness centrality, betweenness centrality, the effect of aging and of self-correlation of times cited. With these analyses, we proposed how to distinguish incremental and radical innovations, to detect emerging papers which could be seeds of radical innovations, and to predict the capability of academic papers to be cited in the future.

**Developing a Novel Patent Map to Explore R&D Directions and Technical Gaps for Thin-film Photovoltaic Industry**
Dong-Shang Chang[1], Chih-Hsi Kao[1]
[1]*National Central University, Taiwan*

This paper addresses a novel technical patent map to effectively mining the patent information among assignee, patent classification, and filing date on thin-film photovoltaic. The proposed technical patent map provides an overall view of technological advancement that allows researchers to monitor competitor deployments, mine the techniques gap, and forecast technology trends. There are 164 patent documents approved by the United States Patent and Trademark Office is employed in the patent analysis. Results indicate that thin-film photovoltaic technology focuses on the fields related to semiconductor devices and the surface treatment of metal materials, which can be deemed as foundational or popular types of technology. However, the technology related to refinement, manufacturing, and after-treatment for metal, monocrystalline, and polycrystalline materials, as well as plating, coating, and connecting surface technologies have been overlooked. In addition, the leading enterprises in capable of continuous innovation and cross-field technology R&D are further identified.

**Quantitative Analyses on Claim Structures of Patent Applications Filed by Market Leaders in the Fields of Analyzing and Diagnostic Devices**
Takashi Miyazawa[1], Hiroshi Osada[2]
[1]*Seiko Epson Corporation, Japan*
[2]*Tokyo Institute of Technology, Japan*

The present study investigates relationships between claim structures of patent applications and market shares of analyzing and diagnostic devices in Japan. In consequence, average numbers of total independent claims of patent application filed by firms whose market shares are in the top positions in their respective markets are significantly greater than those of firms whose shares are 10% or smaller in their respective markets. This result indicates that the number of total independent claims, which is one of important factors for the competitiveness of patent, strongly correlates with high market share.

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|---|---|
| **Session** | Technology and Knowledge Management 3 |
| **Date** | 12/9/2009 |
| **Time** | 15:30 - 17:00 |
| **Room** | Luxembourg I |
| **Chairs** | Jean-Jacques Chanaron, Uchenna Eze |

**Measuring Individual e-Business Capability Working on an Enterprise e-Business System**

Chui Young Yoon[1], Keon Myung Lee[1], Seung Kweon Hong[2]
[1]*Chungbuk National University, South Korea*
[2]*Chungju National University, South Korea*

This study presents a tool for measuring and managing an individual e-Business capability to efficiently execute the given tasks on an enterprise e-Business system. The measurement items for an individual e-Business capability are extracted from the major components of a general competency. By factor analysis and reliability analysis through a pilot test, we proposed a 14-item tool that can totally measure individual e-Business capability. The developed tool has four measurement factor and fourteen items. The utilization of the tool is confirmed by applying it to a case study.

**Applying Grounded Theory to Study Collaborative Climate, Supplier Relationship, Trust, Knowledge Sharing, and Performance in an Organization**

Chyan Yang[1], Keng-Chieh Yang[1], Shih Yuan Tseng[1]
[1]*National Chiao Tung Univeristy, Taiwan*

The purpose of this study is to argue the case for the use of grounded theory as a valid method for the relationship among collaboration climate, supplier relationship, trust, knowledge management, and performance. The grounded theory research method that was employed in this study is a primarily inductive investigative process in which the researcher formulates a theory about a phenomenon by systematically gathering and analyzing relevant data. The aim of this research method is building theory, not testing theory. The data that was gathered for this study primarily consisted of semi-structured in-depth interviews with informants of varying industry, scale and management level.

**Research on the Implementation and Strategy of Organizational Learning**

Jing Sui[1], Liqiang Deng[1], Jiancheng Yu[2]
[1]*Nankai University, China*
[2]*Tianjin Electric Power Corporation, China*

This paper discusses the prerequisite and preparation of the organizational learning (OL) implementation from three aspects of organization structure reform, culture and incentive policies, and OL tools and platforms. Using the thought of project management for reference, the plan of OL implementation will be broken down into a series of sub-projects and small activities to be implemented step by step. And this paper also proposes grading method of OL implementation, dividing OL process into three stages roughly known as prototype, expansion, and institutionalization, as well as gives the objective system and appraisal focuses of each stage, thus offers beneficial reference for OL implementation. Finally, it shows the merits of the idea that taking OL as the sequential decision-making process of the learning strategy for investors, and points out that the grading method of OL is the basis of carrying out the research on OL options.

**Interdisciplinary Research Detection by Citation Indicators**

Yuy Kajikawa[1], Junichiro Mori[1]
[1]*The University of Tokyo, Japan*

Methodology to analyze a vast amount of scientific information is becoming an indispensable component of R&D management. Bibliometrics are one of powerful tools for overviewing scientific activities in a manner that individuals cannot handle. However, it sometimes misses minor but essential part of scientific activities such as interdisciplinary research. Complex issues we face such as sustainability and aging society cannot be solved within an academic discipline and interdisciplinary research and transdisciplinary expertise are essential. In this paper, we measure interdisciplinarity of academic papers by a set of indicators that are obtained by citation network analysis. Betweeness centrality, diversity of references, and diversity of references of references were used to measure interdisciplinarity. A case study was performed in sustainability science to evaluate those indicators. These indicators can detect interdisciplinary papers among a pile of papers. But there is a difference in extracted papers according to the indicators. Characteristics of each indicator were discussed.

**Knowledge Sharing Leveraging New Product Development Activities to Derive Enhanced Business Performance: Mixed Method Study**

Tsu-Te Huang[1], Rodney Stewart[1], Le Chen[1]
[1]*Griffith University, Australia*

Knowledge has been widely recognised as a determinant of business performance. Business capabilities require an effective share of resource and knowledge. Specifically, knowledge sharing (KS) between different companies and departments can improve manufacturing processes since intangible knowledge plays an enssential role in achieving competitive advantage. This paper presents a mixed method research study into the impact of KS on the effectiveness of new product development (NPD) in achieving desired business performance (BP). Firstly, an empirical study utilising moderated regression analysis was conducted to test whether and to what extent KS has leveraging power on the relationship between NPD and BP constructs and variables. Secondly, this empirically verified hypothesis was validated through explanatory case studies involving two Taiwanese manufacturing companies using a qualitative interaction term pattern matching technique. The study provides evidence that knowledge sharing and management activities are essential for deriving competitive advantage in the manufacturing industry.

**Patterns of Technology Catch-up in Korean Private Sector**

Jae-Yong Choung[1], Hye-Ran Hwang[2], Tahir Hameed[1]
[1]*Korea Advanced Institute of Science and Technology, South Korea*
[2]*Daejeon Development Institute, South Korea*

Most studies on catch-up of Korean firms focus on large firms with scale-intensive manufacturing processes. Recently, new patterns of innovation have been observed through linkages of large firms and NTBFs (New Technology Based Firms), necessitating theoretical extension. This paper argues catching-up patterns of latecomer industrialized countries are specialized via interaction of domestic industrial structure and technology-industrial characteristics of particular sector. Especially, dynamic capability building process of the firms as intermediaries with interaction of global industrial characteristics and local industrial structure would result in different patterns of catching up.

**Profiling Innovation System for Solar Photovoltaics in China**

Ying Guo[1], Donghua Zhu[1], Xuefeng Wang[1]
[1]*Beijing Institute of Technology, China*

China is rapidly emerging as an important player in the global photovoltaics market. By adopting a technology innovation systems framework of analysis, the paper identifies the technological and institutional actors and relations of the innovation systems for Solar Photovoltaics in China, and assesses the extent to which these are likely to encourage or constrain the technological development and the market diffusion of this technology. Policy lessens can be derived for the management of innovation in the energy sector and helps understanding of how such innovation could contribute to economic development.

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|---|---|
| **Session** | Manufacturing Systems 1 |
| **Date** | 12/9/2009 |
| **Time** | 11:00 - 12:30 |
| **Room** | Luxembourg II |
| **Chairs** | Vassilis Dedoussis, Ming Zhou |

**Worker Allocation in U-shaped Assembly Lines with Multiple Objectives**
Ronnachai Sirovetnukul[1], Parames Chutima[2]
[1]*Mahidol University, Thailand*
[2]*Chulalongkorn University, Thailand*

The multi-objective worker allocation problems of single and mixed-model assembly lines having manually operated machines in several fixed U-shaped layouts are developed. Three objective functions are simultaneously minimized, i.e. number of workers, deviation of operation times of workers, and walking time. NSGA-II, an evolutionary optimization algorithm, searches only good solutions from the population, but a selection method should also discard the below-average solutions in order to avoid producing bad solutions. The COINcidence algorithm makes use of both good and not-good solutions with reward and punishment schemes to update a better generator. After getting the first objective of minimum number of workers, the rest are compared between NSGA-II and COIN in four measures for all testing problems. Each of the computational results gives a worker good task assignment and walking path. COIN is preferable to NSGA-II in most cases.

**A Framework for MGrid Resource Service Optimal-selection and Composition**
Fei Tao[1], L. Zhang[1], D. Zhao[2]
[1]*Beihang University, China*
[2]*The University of Michigan-Dearborn, United States*

The problem of resource service optimal-selection and composition (RSOSC) in manufacturing grid (MGrid) system is proposed. Based on the authors' previous work, a framework for addressing RSOSC problem in MGrid system is presented. The framework consists of five layers: (1) task layer-responsible for MGrid task decomposition, (2) resource service match and search layer-responsible for searching the qualified resource service according to each decomposed subtask's requirements, (3) resource service QoS processing layer-responsible for collecting QoS information for each candidate resource service, as well as QoS evaluation, comparison, monitor, updating, (4) resource service optimal-selection layer-responsible for evaluating and ranking the candidate resource service for each subtask, and (5) resource service composition layer- responsible for resource service composition and optimal-selection.

**Disassembly Time Evaluation for Enhancing the Reusability of Automotive Components**
Lily Amelia[1], Dzuraidah Abd. Wahab[1], Ahmad Rasdan Ismail[1], Che Hassan Che Haron[1]
[1]*Universiti Kebangsaan Malaysia, Malaysia*

Recovery of products including reuse, remanufacture and recycle is now emerging as an important strategy for reducing wastes to the environment. Among others, the automotive industry is the leading industry in this environmental consciousness manufacture. Research and development on automotive component design and manufacture as well as tools and methods to facilitate reuse are under way in several countries. To enable reuse, the determinant factors must be studied including the disasssemblability of the product. This study focuses on disassembly time evaluation of a locally produced car door using MOST Measurement System method. The existing design of the car door was evaluated and design changes were proposed to improve the ease of disassembly design of the car door. Significant improvements to the design and disassembly time is presented and discussed in this paper.

**Optimum Spray Cooling in Continuous Slab Casting Process Uder Productivity Improvement**
Kiatkajohn Worapradya[1], Purit Thanakijkasem[1]
[1]*King Mongkut's University of Technology Thonburi, Thailand*

In addition to casting speed, an improper control of temperature at the strand surface and center directly affects the product quality (e.g., cracking) in the continuous slab casting. In this study, an optimal control of temperature at the surface and center is achieved by using an optimal secondary cooling rate with a consistent casting speed. To optimize the cooling rate, both a solidification model based on a finite difference technique and an objective function, which satisfies the metallurgical criteria and the resource consumption, are developed. Case studies on quality and productivity improvements are raised and searched an optimal solution by a genetic algorithm. The results show that the effective maintain of the strand temperature with low water consumption can be achieved under the increased casting speed.

**A Quantum Particle Swarm Optimization Approach for the Design of Virtual Manufacturing Cells**
Rahul Caprihan[1], Jannes Slomp[2], Gursaran[1], Khushboo Agarwal[1]
[1]*Dayalbagh Educational Institute, India*
[2]*University of Groningen, Netherlands*

In this paper a QPSO procedure is proposed for the design of virtual manufacturing cells within which machines and jobs are assigned to the cells with a view to maximize productive output, whilst simultaneously minimizing the inter-cell movements due to the limited availability of machines. The QPSO results are compared with both a GA approach as well as a preemptive / lexico goal programming approach. It is observed that the suggested procedure performs well for the assumed VCM design problem.

**Empirical Results About the Nash-Cournot Equilibrium**
Eyal Brill[1], Amnon Gonen[2], Eli Fligel[2], Eduard Goldshtein[2]
[1]*Decision Makers Ltd., Israel*
[2]*Holon Institute of Technology, HIT, Israel*

The Nash-Cournot equilibrium theorem is based on some assumptions that usually do not hold true in reality. In this study, duopoly market equilibrium is tested by a group of players using a special business simulator that was adopted specifically for this task. The competing players knew their market in advance and had received their opponent's price, quantity of product and profits in the previous yearly quarter. Equipped with this knowledge, each participant (firm) had to make decisions regarding their current price, and quantity of products. The results showed that these decisions were mainly influenced by the difference in quantities and price, rather than the actual prices and quantities, as was expected. Moreover, if the prices and quantities of both firms were quite similar, they believed they had achieved a state of equilibrium, although they were sometimes quite far from it.

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|---|---|
| **Session** | Manufacturing Systems 2 |
| **Date** | 12/9/2009 |
| **Time** | 13:30 - 15:00 |
| **Room** | Luxembourg II |
| **Chairs** | Ali Siadat, Rahul Caprihan |

**Organizational Innovation of Traditional Manufacturing Industry Based on Industrial Evolution**
Zheng Ye[1], Ning Cai[1], Jianzhuang Zheng[2]
[1]*Zhejiang University, China*
[2]*Zhejiang University City College, China*

Traditional manufacturing industry has a great influence on China's economic growth in the previous years, but it has encountered difficulties in the process of industrial evolution. To achieve a sustainable development, it must start to conduct organizational innovation. This article traces the relationship between organizational innovation and industrial evolution for traditional manufacturing, and provides an empirical analysis with 130 non - state - owned traditional manufacturing enterprises in Zhejiang province. The conclusion is that there is a positive correlation between organizational innovation and industrial evolution. With an analysis of how five attributes of industrial evolution influences organizational innovation, we further conclude that only one attribute of industrial evolution has a negative influence to organizational innovation.

**Research of Chinese Manufacturing System on Game-Schily Theory**
Li yueen[1], Jun Zhao[1], H.B. Luo[1]
[1]*Shandong University, China*

The modern enterprise needs to be managed under the strategy and the culture, in generally, the strategy and the culture lie on the top level. It is a miracle on the growth of Chinese economic in the past 30 years. How to improve the enterprise viability is the key for all the manufacture organizations. The culture and the strategy of company are the supporting elements for the enterprise running well under the humanity and harmony. For enterprise management, the game theory is the method of facing the competition among the modern manufacturers and the consumers; the Chinese ancient theory Schily (the science of doing things) is the important management thinking on dealing with the relation between the objective and human from nature. In the paper, the new manufacturing management method is derived by combining the game theory and the Schley theory. Flowing the new theory, the paper gives the conception of Game-Schley for new manufacturing system on Chinese enterprises, deduced its meaning and the frame, and explained its origination, in the end, the driving force of the manufacturing system for China enterprise is drown out.

**An Integrated Assembly Sequence Planning and Plant Assignment Model for Products Assembled in a Multi-plant System**
Yuan-Jye Tseng[1], Jian-Yu Chen[1], Feng-Yi Huang[1]
[1]*Yuan Ze University, Taiwan*

In a global logistic environment, the assembly operations for producing a product can be distributed at different plants in a multi-plant collaborative manufacturing system. In this research, an integrated model is presented to simultaneously perform assembly sequence planning and plant assignment. In assembly sequence planning, the assembly operations are sequenced according to the assembly constraints and assembly cost objectives. In plant assignment, the assembly operations are assigned to the suitable plants to achieve the multi-plant cost objectives. First, the assembly precedence graphs and matrices are developed for checking feasible sequences. Next, a genetic algorithm (GA) method is presented to perform assembly sequence planning and plant assignment with an objective of minimizing the total of assembly costs and multi-plant costs. Finally, an example product are tested and discussed in this paper. The test results show that the presented method is feasible and efficient for solving the multi-plant assembly sequence planning problem.

**Controlling Flow Time Delays in Flexible Manufacturing Cells**
Jannes Slomp[1], Rahul Caprihan[2], J.A.C. Bokhorst[1]
[1]*University of Groningen, Netherlands*
[2]*Dayalbagh Educational Institute, India*

Flow time delays in Flexible Manufacturing Cells (FMCs) are caused by transport and clamping/re-clamping activities. This paper shows how dynamic scheduling parameters may control the flow times of jobs and the available task windows for flow time delays.

**Developing Competitive Products Using Stereolithography Rapid Prototyping Tools**
Vassilis Dedoussis[1], John Giannatsis[1]
[1]*University of Piraeus, Greece*

The competition that manufacturing industries are facing in today's economic environment is tremendous. The markets today are international, they ask for better and cheaper products, in shorter times, with a higher 'innovative content'. In order to achieve these goals the manufacturing industry has to resort to computer aided-driven, practices and tools, that have emerged over the last two decades and which not only shorten the overall product development cycle but also increase the product innovation dynamic. Some of the most important such tools are those collectively known as Rapid Prototyping tools, which can build physical 3D prototypes of a product, production tools or even small batches of the actual product itself, within a few hours. The purpose of this paper is to present the most prominent and mature of the Rapid Prototyping technologies, namely Stereolithography, and investigate its role in the design and development process of competitive products. The presentation is carried out by discussing specific successful test-cases that concern the development of new plastic products and/or the improvement of 'older' versions of them.

**Manufacturing Process Management with Aggregated Process Models**
Mohsen Sadeghi[1], Ali Siadat[1], Jean-Yves Dantan[2], Régis Bigot[1]
[1]*Arts et Metiers ParisTech, France*
[2]*Arts et Métiers ParisTech, France*

Manufacturing process modeling is the main subject of manufacturing environment design and computerized manufacturing support systems and consequently it takes a vast resources in order to properly obtain an optimized process modeling by experts in charge. In process modeling which regarding to its major impact considering it's interaction with every manufacturing element seems to be quite an issues. In this context, this research is willing to establish a methodology to provide a series of techniques and approaches to simplify the representation of manufacturing models in which the manufacturing processes are combined into aggregate models, exploiting their common repetitive operations. The aim of the early process selection from aggregated process models, combined with product-process compatibility analysis is to determine the various parameters and to integrate the diverse constraints imposed by different experts. In manufacturing systems, this analysis is first and foremost based on the experimental knowledge of the experts. The research results presented here contributes also to knowledge-based integrated manufacturing support by correlating the interrelationships between knowledge extracted from product development process, which can be used to address requirements throughout the design cycle.

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|---|---|
| **Session** | Manufacturing Systems 3 |
| **Date** | 12/9/2009 |
| **Time** | 15:30 - 17:00 |
| **Room** | Luxembourg II |
| **Chairs** | Rui Sousa, Jannes Slomp |

**Analysis and Control of Electrical Discharge Machining (EDM) Process**

Ming Zhou[1], Fuzhu Han[2], Xianyi Meng[1], Baojiang Chen[1]
[1]*Beijing Institute of Civil Engineering and Architecture, China*
[2]*Tsinghua University, China*

A time series of gap states reflecting electrical discharge machining (EDM) process is used to analyze the process. In linear analysis autocorrelation function and power spectral densities are computed to grade machining powers in different sub processes; in nonlinear analysis surrogate data method is used to prove the deterministic nonlinearity of a sub process, an efficient machining process. The deterministic nonlinearity of the process educes the possibility of building a timely varied linear model, approximating the varied gap states. Based on real-time estimated parameters of the model, by using minimum-variance control strategy, a self-tuning regulator is designed to automatically regulate electrode down-time so that gap states follow a specified gap state with the purpose of much faster and more stable machining than an open-loop machining without an adaptive control.

**Production Reengineering and Risk**

Chang Ding[1], Lee Chen[1]
[1]*California State University, United States*

This paper examines random production yields and rigid demand orders. Several production runs may be required to satisfy the demand and no penalties are allowed. Studies usually examine objective functions that are associated with the minimization of expected costs. Nevertheless, in some instances the manufacturer may consider other production policies that deviate from the optimal cost-minimizing process. If risk is an important factor, then this deviation can dramatically reduce costs. This scenario rises in a utility theory context. We present a technique that calculates the cost's variance for general production processes when considering a single stage production.

**Analytic Model of Machining Errors for Thin Walled Parts Based on the Deformation of the Workpiece-fixture System**

Faping Zhang[1], Jiping Lu[1], Tang shuiyuan[1], Yan Yan[1], Houfang Sun[1]
[1]*Beijing Institute of Technology, China*

The analytic model of machining errors caused by the deformation of workpiece-fixture system is put forward for the thin walled parts. To facility the analysis, the mathematical model of tolerance zone is redefined. According to the deformation value of workpiece-fixture system calculated by FEA (Finite element analysis), transform matrixes of workpiece location and cutting points deviation have been constructed. So that the location changes of the surface machining points can be acquired. Then machining error model is formulated to describe deviations caused errors. Further for given surface tolerances the sensitive matrix is constructed to evaluate the influence of locators on the machining errors. Finally, a study case is used to support and validate the proposed model.

**Developing a Model for Integrating Process Planning and Production Planning and Control in Cellular Manufacturing**

Amir hasanzadeh[1], Omid Moghadardoust[1], Mehdi fathi[2], Reza ramazani khorshiddoost[1]
[1]*AmirKabir University of Technology, Iran*
[2]*Iran University of Science and Technology, Iran*

Organizations willing to succeed in global competition have to integrate their internal and external processes. The goals, information and decisions taken in production planning and control and process planning are often very different and difficult to integrate. In this paper, firstly the latest production planning framework in cellular manufacturing has been reviewed and modified. This framework has been customized to meet requirements and constraints of the Iran electronics industries. The application of the models has been considered as a case study for a production system in electronics and telecommunication sector in a plant in Iran. The validity of the presented model has been tested by the experts of several sections of the plant, studied as the case.

**Optimization of Dissimilar Joining of Titanium / Aluminum**

Ezzeddin Anawa[1], Omer Elmabrouk[1], Abdul-ghani Olabi[2]
[1]*Garyounis University, Libyan Arab Jamahiriya*
[2]*Dublin City University, Ireland*

Titanium G2 and aluminum were overlapped and joined using CO2 continuous Laser welding technology. Welding pool geometry of the aluminum plate of joints were measured and examined. Taguchi method was used for designing the experimental and mathematical models to predict the concerned response. The developed mathematical models were used for optimising the welding pool geometry of joints.

**An Industrial Application of Resource Constrained Scheduling for Quick Changeover**

Rui Sousa[1], Rui M. Lima[1], Dinis Carvalho[1], Anabela Alves[1]
[1]*University of Minho, Portugal*

This paper describes the improvement of the quick changeover process of a painting line in a wooden frames factory. The well-known SMED technique (Single Minute Exchange of Die) was applied. However the characteristics of the setup operations (those characteristics also occur in other industrial changeover scenarios) have revealed the possibility of advantageous utilization of resource constrained project scheduling methods. The application of one of these methods represents an innovative contribution to the quick changeover area, allowing (when applicable) the scheduling of the involved setup operations, considering their duration, precedence relations and resources' need, in order to achieve a reduced setup time.

**Analysis of Generic Product Information Representation Models**

João Paulo Gomes[1], Rui M. Lima[1], Paulo Martins[1]
[1]*University of Minho, Portugal*

Production systems are changing to meet customers' increasingly demand for customised products and lower delivery times. Mass customization is a production paradigm used in organizations that aim at satisfying these customers. In these new high product diversity and customization environments, Production Information Systems must be able to deal with a large number of product variants in an efficient way. Generic referencing models aim to answer this objective in the representation of product information for production planning and control systems. Three generic referencing models are characterised according to part identification and bill of materials (BOM) representation. Furthermore, application of generic referencing in an industrial case is presented and compared with direct referencing models.

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| **Session** | Reliability and Maintenance Engineering 1 |
| **Date** | 12/9/2009 |
| **Time** | 11:00 - 12:30 |
| **Room** | Luxembourg III |
| **Chairs** | Norman Schneidewind, Renzuo Xu |

**Maintenance Criticality Analysis Using TOPSIS**
Anish Sachdeva[1], Pradeep Kumar[2], Dinesh Kumar[2]
[1]*National Institute of Technology Jalandhar, India*
[2]*Indian Institute of Technology, India*

In this paper, a multi factor decision making approach is presented for prioritizing failures causes for the digester of pulping system of a paper mill as an alternative to traditional approach of failure mode and effect analysis (FMEA). The approach is based on the 'technique for order preference by similarity to ideal solution' (TOPSIS). The priority ranking is formulated on the basis of six parameters (failure occurrence, non detection, maintainability, spare parts, economic safety and economic cost). The Shannon's entropy concept is used for assigning objective weights to maintenance parameters.

**Failure Rate Calculation: Extending JESD74/JESD74A to Any Sample Size**
Siyuan Frank Yang[1], Wei-Ting Kary Chien[1]
[1]*Semiconductor Manufacturing International Corporation, China*

The failure rate has been an important index in product reliability. Practitioners in microelectronics reliability have been using JEDEC standards to determine whether a product will pass the requirement of a pre-specified failure rate. The limitation of the method used by JESD74 and its revision JESD74A in determining the upper confidence limit for failure rate is pointed out and discussed. Very large relative errors such as 40% have been shown for certain sample sizes which are not sufficiently large enough. This paper provides practitioners an exact method to calculate the confidence bounds of failure rates and therefore make JESD74 and its revision JESD74A complete to any sample size.

**Reliability Analysis Methods for an Open Source Software with Their Comparison of Goodness-of-Fit**
Yoshinobu Tamura[1], Shigeru Yamada[2]
[1]*Yamaguchi University, Japan*
[2]*Tottori University, Japan*

An open source software serves as key components of critical infrastructures in the social life. We focus on the quality problems of open source software developed under the open source project. In case of considering the effect of the debugging process on an entire system in the development of a method of reliability assessment for the open source project, it is necessary to grasp the deeply-intertwined factors, such as programming path, size of each component, skill of fault reporters, and so on. We propose a new approach to reliability assessment for open source software. Also, we analyze actual software fault-count data to show numerical examples of software reliability assessment for the open source software. Moreover, we compare the goodness-of-fit of the method based on chaos theory with the conventional software reliability growth models for open source software by using several comparison criteria of goodness-of-fit.

**The Degradation-Rate-Reduction Preventive Maintenance Policies with Warranty in a Finite Time Span**
Chun-Yuan Cheng[1], Te-Hsiu Sun[1], Jr-Tzung Chen[1], Mei-Ling Liu[2]
[1]*Chaoyang University of Technology, Taiwan*
[2]*National Taipei University of Technology, Taiwan*

A system normally has a finite useful life. The new system in each replacement cycle seldom has exactly the same characteristics and properties. However, maintenance problems are usually defined over the infinite time span where the system is assumed to have the same conditions and costs in each replacement cycle. This assumption might not be practical. Therefore, the purpose of this research is to develop the optimal preventive maintenance (PM) policies with degradation rate reduction over a finite time span under a warranty consideration by minimizing the expected total maintenance cost. Two cases are studied and compared, one is no warranty provided and the other is with a given warranty period. For the second case, two policies, performing and not performing PM within the warranty period, are examined. In this paper, the algorithm for searching the optimal solution is presented. Examples are given and the sensitivity analysis is also provided.

**Optimal Backup Time of Database by Differential Backup Method**
Syouji Nakamura[1], Keiko Nakayama[2], Toshio Nakagawa[3]
[1]*Kinjo Gakuin University, Japan*
[2]*Chukyo University, Japan*
[3]*Aichi Institute of Technology, Japan*

Some media failures occur at random. To lessen the overhead of backup processing, the operation of a cumulative backup with small overhead is adopted between the operations of a full backup. The mean time to full backup and the expected cost of these schemes are derived, using the theory of cumulative processes. The total backup operation expected cost is practically given by this parameter and an optimal full backup interval is easily determined.

**Two-Dimensional Software Reliability Measurement Technologies**
Shinji Inoue[1], Shigeru Yamada[1]
[1]*Tottori University, Japan*

This paper discusses two-dimensional software reliability measurement technologies, which describe a software reliability growth process depending on two-types of software reliability growth factors: Testing-time and testing-effort factors. Our two-dimensional software reliability measurement technologies enable us to conduct more feasible software reliability assessment than the one-dimensional (conventional) software reliability measurement approach, in which it is assumed that the software reliability growth process depends only on testing-time. We also conduct goodness-of-fit comparisons of our models with existing one-dimensional software reliability growth models. Finally, as one of the examples for two-dimensional software reliability analysis, we show examples of the application of our two-dimensional software reliability growth model by using actual data.

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| **Session** | Reliability and Maintenance Engineering 2 |
| **Date** | 12/9/2009 |
| **Time** | 13:30 - 15:00 |
| **Room** | Luxembourg III |
| **Chairs** | Shinji Inoue, Ken McNaught |

**ARL Criterion in Bayesian Process Control using Hidden Markov Model**
Rui Jiang[1], Viliam Makis[1]
[1]*University of Toronto, Canada*

In this paper, a multivariate Bayesian control chart is designed for a condition-based maintenance application. The system deterioration process is modeled as a 3-state hidden Markov process, with good, warning and failure states. Bayesian control chart is then applied to monitor the process by plotting the posterior probability that the system is in the warning state. It has been shown in the literature that Bayesian control chart is an optimal tool for statistical process control unlike traditional control charts. In this paper, a new fault detection scheme is developed based on the average run length criterion. Comparison results with former control chart methods are provided to illustrate the effectiveness of this approach.

**Research on Network Reliability of District Heating Systems Based on the Combined Planar Network Model**
Peng Wang[1], Pinghua Zou[1]
[1]*Harbin Institute of Technology, China*

The method that heating network reliability is evaluated by the connected reliability is put forward in this paper. According to the determinability of flow direction in certain pipes of heating network, the combined planar network model is built instead of the spatial network model in order to decrease the complexity as solving the connected problems. Using the Boolean calculation, the spanning tree set from heat source to all heat users is solved by the minimal path sets indirectly. Then the connected reliability of heat users and heat source are finally figured out. The application of the connected reliability in the research on network reliability of district heating systems is discussed at last.

**The Evaluation of Reliability Indices Of a Restructured Distribution System Considering the Reserve Agreement**
Ali Saidian[1], Mohamad Amiri[1], Mina Sheikholeslami[2]
[1]*Shahid Chamran University, Iran*
[2]*Iran University of Science and Technology, Iran*

Power system deregulating has changed the mechanism of system reliability management. This paper presents a technique used for the reliability evaluation of deregulated distribution systems considering reserve agreement between Gencos using reliability network equivalent techniques. A reliability model for each market player in a deregulated power system is introduced in which a generation company is represented by an equivalent multistate generation provider (EMGP) and the transmission system is represented by an equivalent multistate transmission provider (EMTP). A Genco, which has reserve agreements with other Gencos, is represented by an equivalent multistate generation provider with reserve agreement (EMGPWR).This paper has provided a new approach in determining the interrupt value during the Transmission contingency for each customer considering priority of load curtailment. Optimal power flow (OPF) is used to replace AC power flow to check network constraints in each contingency state. Reserve agreements between suppliers are considered to improve reliability indices. A reliability test system (RBTS) has been analyzed to illustrate the technique.

**Applications of Software Reliability Using the IEEE/AIAA Recommended Practice on Software Reliability**
Norman Schneidewind[1], Mike Hinchey[2]
[1]*Naval Postgraduate School, United States*
[2]*Iero, Ireland*

Software-based systems have become the dominant player in the computer systems world. Since it is imperative that computer systems operate reliably, considering the criticality of software to the success of contemporary systems, the IEEE and AIAA commissioned the development of a new standard called the Recommended Practice on Software Reliability. The purpose of this paper is to explain the key features of this new standard to researchers and practitioners. To enhance understanding, our paper is augmented with illustrative problems and solutions.

**Extended Maintenance and Inspection Models for a Parallel System**
Satoshi Mizutani[1], Toshio Nakagawa[2], Mingchih Chen[3]
[1]*Aichi University of Technology, Japan*
[2]*Aichi Institute of Technology, Japan*
[3]*Chaoyang University of Technology, Taiwan*

This paper discusses an optimal maintenance policy for a parallel system with periodic inspection. The system is composed of several units which have an independent and identical distribution. When the number of failed unit exceeds a threshold level, the system incurs a loss cost per unit of time from a failure to the next inspection. When the next inspection finds the failure, the system is overhauled, and the system becomes like new. Further, the system is overhauled at planned time in spite of the state of the system. Introducing the loss cost for an inspection and overhaul, the expected cost is obtained and an optimal number of inspections which minimizes the expected cost rate is derived analytically. Numerical examples are given when the failure distribution of each unit is exponential.

**A General Formulation of Optimal Testing-time Allocation for Modular Systems**
Xiang Li[1], Min Xie[1], Szu Hui Ng[1]
[1]*National University of Singapore, Singapore*

Software testing is very costly in software development and the testing-time during the module testing phase is limited. Thus, the problem of optimal testing-time allocation is of great importance in practice. In this paper, a general formulation of optimal testing-time allocation for modular systems is proposed. The objective is to maximize the reliability of the entire software system. In our formulation, both architecture-based models and non-homogeneous Poisson process (NHPP) models are used. The assumptions are also highlighted to help practitioners better under the limitations that need attention. A numerical example is provided and sensitivity analysis is conducted to detect significant parameters.

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| **Session** | Reliability and Maintenance Engineering 3 |
| **Date** | 12/9/2009 |
| **Time** | 15:30 - 17:00 |
| **Room** | Luxembourg III |
| **Chairs** | Renyan Jiang, Young C. Park |

**Neural-Network-Based Approach on Reliability Prediction of Software in the Maintenance Phase**
Yung-Chung Chen[1], Xiao-Wei Wang[1]
[1]*SHU-TE University, Taiwan*

Maintenance of software involves debugging of errors and implementations of enhancement requested by users, these both cause the reliability of software decreased. For the systems that have been used for a considerably long period of time, the various details concerning the initial development phase are usually not known to the users who are responsible for the maintenance of these systems. These cause the estimation of software reliability more difficult. In this paper, a prediction model based on Back-Propagation Neural Network (BPN) is proposed to estimate the failures of the software system in the maintaining phase. The "failure correction" records and the "enhancement" records are chosen as the input data of the prediction model, the future failure time is the output. A numerical example of a commercial Shop Floor Control system (SFC) is used to illustrate the validation and application of the proposed method.

**Estimation of Cutting Tool Failure Costs**
Zydrunas Vagnorius[1], Knut Sorby[1]
[1]*Norwegian University of Science and Technology, Norway*

Probabilistic cutting tool replacement models assume that tool life is stochastic in nature. This implies that a tool can wear out before the planned replacement, as a result of which penalty costs are incurred. If these costs, as well as tool failure function and the cost of scheduled replacement, are known, optimal tool replacement time can be found. While many researchers have focused on the latter two elements, there are very few articles explaining what penalty costs are and how they should be calculated. Therefore this article presents an approach for estimating the costs of tool failure for a one-stage machining operation.

**A Model of Open Source Software Maintenance Activities**
Chengjie Xiong[1], Yanfu Li[1], Min Xie[1], Szu Hui Ng[1], Thong Ngee Goh[1]
[1]*National University of Singapore, Singapore*

The development of computer networks, especially the internet, has largely facilitated the communications among software developers and it resulted a thriving of open source software systems (OSS). As more and more open source software systems are deployed by individuals and enterprises, it is vital to study such systems separately from traditional software systems since their development and maintenance processes are fairly different. In this paper, we investigate a type of behaviors of software maintenance of open source software systems and propose an approach that is based on NHPP with Rayleigh function to model the maintenance activities. Using the proposed model, the maintenance events could be estimated with high confidence and this will certainly assistant software maintenance planning. A numerical example using from the data from Apache project is shown to illustrate the application of our model.

**A Study of Software Reliability Models Choice Based on Bidirectional Learning Fuzzy Neural Network**
Bing Chao[1], Renzuo Xu[1], Minyan Gu[2]
[1]*Wuhan University, China*
[2]*No.2 Architecture Design Institute of Shijiazhuang, China*

The calculation of software reliability is chiefly dependent on choice of software reliability models (SRMs) and the ways of software reliability computation is not invariable through software life cycle as well. In this paper, a multi-variables two-way learning fuzzy neural network (FNN) is presented, by which the problem of comparison and choice of SRMs could be solved effectively and the system reliability factors could be decided as early as possible.

**Improving Reliability Design of Multi-state K-out-of-N Systems by Fuzzy Programming**
Vahid Ebrahimipour[1], Ali Azadeh[1], Seyed Fouad Quarashi[1]
[1]*University of Tehran, Iran*

In a multi-state system, both the system and its components are allowed to experience more than two possible states, e.g. completely working, partially working or partially failed, and completely failed. In this paper reliability evaluation and reliability optimization of k-out-of-n systems are studied for the case where the components and the system have multiple performance levels. A recursive algorithm is used for reliability evaluation of multi-state k-out-of-n systems with independent components. Then a fuzzy model is presented for minimization total cost subject to reliability constraint. In the fuzzy model we use a fuzzy constraint for reliability that may we use different weights to constraint and objective function, and as a consequence we can consider the amount of importance of each objective function and reliability constraint. Finally a numerical example is given.

**Optimization Multi-state Series Weighted K-out-of-n Systems by Ant Colony Algorithm**
Vahid Ebrahimipour[1], Ali shabani[1]
[1]*University of Tehran, Iran*

In this paper a multi state series-weighted k-out-of-n system is presented. This system has S multi state weighted k-out-of-n subsystems that are seriely connected. A new approach is used for calculating reliability of the system. In this approach first we find reliability of each subsystem by recursive algorithm, and then the universal moment generating function (UMGF) is used to calculate reliability of the whole system. In the following reliability of the system is optimized. Multi-state system (MSS) reliability is defined as the ability to maintain a specified performance level. Objective function in the optimization model is maximizing the reliability of the system, constraint is cost and weight of the system and decision variables are the number and the versions of components for each subsystem. Since this problem is a combinatorial and Np-hard problem, ant colony algorithm is used for optimization.

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| **Session** | Operations Research 1 |
| **Date** | 12/9/2009 |
| **Time** | 11:00 - 12:30 |
| **Room** | Montparnasse I |
| **Chairs** | Parthasarathy Ramachandran, Shin-Guang Chen |

**The Selection of Clients for Promotion Campaigns by Means of Mathematical Programming**
Fabrice Talla Nobibon[1], Roel Leus[1], Frits Spieksma[1]
[1]*Katholieke Universiteit Leuven, Belgium*

This paper presents an optimization model for the selection of sets of clients that will receive an offer for one or more products during a promotion campaign. The complexity of the problem makes it very difficult to produce optimal solutions using standard optimization methods. We propose an alternative set covering formulation and develop a branch-and-price algorithm to solve it. We also describe seven heuristics to approximate an optimal solution. We perform extensive computational experiments for the two formulations as well as for the seven heuristics.

**Cooperative Coevolutionary Optimization Method for Product Family Design**
Lothar Schulze[1], Li Li[1]
[1]*Leibniz University Hannover, Germany*

Under the mass customization paradigm, an increasing number of companies design a family of product variants simultaneously, instead of designing one product at a time. Product family design is a way to share resources through commonality among the products so as to shortening product lead-times while introduce adequate product variety in the competitive market in a cost-effective way. The key to using this approach successfully is to achieve the right trade-offs between commonality and performance product family. A product family design model is proposed as an optimization problem with two objectives. One represents the average performance of the product variants and the other is the measure of commonality of the product family in the presence of multiple levels. Optimal decisions include which design variables should be common among which product variants, and the values of each variable of each product variant in the family. A multiobjective cooperative coevolutionary algorithm is developed for simultaneous design of a family of product variants. Computational experiments are conducted using the design of a family of welded beams to demonstrate the effectiveness of the product family design method proposed in this paper.

**Charlemagne's Challenge: The Periodic Latency Problem**
Sofie Coene[1], Gerhard Woeginger[2], Frits Spieksma[1]
[1]*Katholieke Universiteit Leuven, Belgium*
[2]*Technical University Eindhoven, Netherlands*

Latency problems are characterized by their focus on minimizing total waiting time for all clients. We consider periodic latency problems: an extension of standard latency problems. In a periodic latency problem each client has to be visited regularly. More precisely, given is a server traveling at unit speed, and a set of clients with their positions. To each client a periodicity is associated that is the maximal amount of time that is allowed to pass between consecutive visits of the server to the client. In a problem we denote as PLPP, the goal is then to find a repeatable route for the server visiting as many clients as possible without violating the periodicities. Further, we consider the PLP in which the number of servers needed to serve all clients is minimized. We give polynomial-time algorithms and NP-hardness results for these problems depending upon the topology of the underlying network.

**Stage-lookahead Dynamic Programming Algorithms for Stochastic Problems with Time-lagged Control Dynamics**
Eiji Mizutani[1], Stuart Dreyfus[2]
[1]*National Taiwan University of Science and Technology, Taiwan*
[2]*University of California at Berkeley, United States*

We investigate three stochastic problems (linear dynamics quadratic criterion, minimum-cost path, equipment replacement) with time-delayed control dynamics. We show how the concept of ``stage lookahead'' helps to reduce the number of arguments in the optimal value function of dynamic programming in order to alleviate the so-called curse of dimensionality.

**Scatter Search for a Real-life Fleet Size and Mix Vehicle Routing Problem with Time Windows in Iran**
Ahmad Reza Pourghaderi[1], Seyed Ali Torabi[1], Saeideh Sekhavat [2]
[1]*University of Tehran, Iran*
[2]*University of Isfahan, Iran*

The fleet size and mix vehicle routing problem (FSMVRP) consists of defining the type, the number of vehicles of each type, as well as the order in which to serve the customers with each vehicle when a company has to distribute goods to a set of customers geographically spread, with the objective of minimizing the total costs. In this paper, we study a real-life FSMVRP with time windows (FSMVRPTW) that occurs in a major Iranian industrial group. To find satisfying solutions to this complex problem, we propose a scatter search (SS) algorithm. Next, the solutions obtained are compared with the current vehicles and routes used actually by the company. Our results show that the total distribution cost can be reduced significantly when the proposed method is used.

**Logistics Planning for Agricultural Vehicles**
Osman Ali[1], Dirk VanOudheusden[1]
[1]*Katholieke Universiteit, Belgium*

At the present time, agricultural operations are mostly carried out with agricultural vehicles. To maximize the economic returns from agricultural production, the operating costs of the vehicles have to be minimized. This paper presents an integer linear programming formulation to improve the utilization of the agricultural vehicles during the crop harvesting process. Crops are harvested by combine harvesters. The harvested product is transferred to a tractor trailer every time the combine harvester's storage capacity is reached. The proposed planning method specifies optimal routes and interactions for the agricultural vehicles in the field. The planning model is based on the minimum-cost network flow problem and minimizes non-productivity.

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| **Session** | Operations Research 2 |
| **Date** | 12/9/2009 |
| **Time** | 13:30 - 15:00 |
| **Room** | Montparnasse I |
| **Chairs** | Lothar Schulze, Sofie Coene |

**Efficiency Evaluation of Natural Gas Power Plants Using Data Envelopment Analysis**
Styliani Sofianopoulou[1], Vassilis Dedoussis[1], Konstantinos Konstas[1], Agelos Kassimis[1]
[1]*University of Piraeus, Greece*

The purpose of this paper is to evaluate the efficiency of a network of natural gas power plants using the Data Envelopment Analysis approach. The network is modeled as a linear system with multiple inputs and outputs. As inputs one could consider, for instance, the age of a plant, the total number of hours that a plant is in operation during each year, etc. As outputs the model considers the electrical energy delivered per year, the number of hours that the plant is not in operation, etc. The proposed approach does not only evaluate each plant relative to the other ones, but it also 'produces' policy making scenarios that would enable plant managers to improve the plant's operational characteristics. Computational results based on real-world data are presented and discussed. Relationships between efficiency scores and various inputs/outputs are also investigated and some interesting trends are identified.

**Solving a Dock Assignment Problem as a Three-stage Flexible Flow-shop Problem**
Lotte Berghman[1], Roel Leus[1]
[1]*Katholieke Universiteit Leuven, Belgium*

This paper presents a model for a dock assignment problem based on the situation encountered in a practical case. Trailers are assigned to gates during a specific period in time for loading or unloading activities. The parking lot is used as a buffer zone. Transportation between the parking lot and the gates is performed by additional resources called terminal tractors. The problem is modeled as a three-stage flexible flow shop, where the first and the third stage share the same identical parallel machines and the second stage consists of a different set of identical parallel machines. Different mathematical formulations are given and a Lagrangian relaxation approach is examined to solve this flexible flow-shop problem.

**R&D Project Planning with Multiple Trials in Uncertain Environments**
Stefan Creemers[1], Bert De Reyck[2], Roel Leus[1]
[1]*Katholieke Universiteit Leuven, Belgium*
[2]*University College London, United Kingdom*

We study project scheduling when individual activities carry a risk of failure, and where an activity's failure may lead to the project's overall failure. In the project planning and scheduling literature, this technological uncertainty has typically been ignored and project plans are developed only for scenarios in which the project succeeds. To mitigate the risk that an activity's failure jeopardizes the entire project, more than one alternative may exist for obtaining certain results, and these alternatives can be implemented either in parallel or sequentially, allowing to model the pursuit of alternative technologies.

**Risk Prediction of Marine Traffic Based on Fractal Interpolation Algorithm**
Shenping Hu[1], Zhiyu Chen[1], Cunqiang Cai[1], Jinpeng Zhang[1]
[1]*Shanghai Maritime University, China*

Risk prediction is the key element in risk managements. The commonly quantitative prediction methods approaches focus on reasoning by statistics data. This paper held out the Fractal interpolation algorithm to solve the time series data by means of transferring the discrete data to continue data. On the basis of introduction of fractal theory applying the feasibility to marine traffic accidents, it is presented by evaluating iterated function system and its attractor, which uses fractal interpolation algorithm to handle discrete data aggregating with time series, and then models the risk prediction of marine accidents theoretically. Finally, taking statistic data of marine traffic accidents as case studies, it proves that the data reasoning model is more accurate than common computing algorithm special for high fluctuant curve.

**Scheduling Outpatients in Hospital Examination Departments**
Xiaofeng Hu[1], Hui Wu[1], Shaoming Zhang[2], Xing Dai[2], Ye Jin[1]
[1]*Shanghai Jiao Tong University, China*
[2]*Shanghai Ninth People Hospital, China*

Outpatients scheduling problem in examination departments allocates hospital equipments to patients and decides on the time to perform examination. This task plays a important role in utilizing the limited hospital equipments efficiently while ensuring quality of service for patients. First, the history examinations data of the hospital is analyzed, and the bottleneck department is defined. Then, some dispatching rules for the outpatient examination are developed to minimize total waiting time subject to minimum idle-time of the equipments in bottleneck department. Computational experiments are performed on the real data collected from Shanghai Ninth People Hospital, and the results show that the algorithm is efficient to reduce the waiting time of the outpatients.

**Vehicle Routing Problem with Load Compatibility Constraints**
Parthasarathy Ramachandran[1]
[1]*Indian Institute of Science, India*

The major contribution of this paper is to introduce load compatibility constraints in the mathematical model for the capacitated vehicle routing problem with pickup and deliveries. The employee transportation problem in the Indian call centers and transportation of hazardous materials provided the motivation for this variation. In this paper we develop a integer programming model for the vehicle routing problem with load compatibility constraints. Specifically two types of load compatability constraints are introduced, namely mutual exclusion and conditional exclusion. The model is demonstrated with an application from the employee transportation problem in the Indian call centers.

**The Best Exponents of Corporate Social Responsibility and Organisation Behaviour**
Alex Manzoni[1], Sardar Islam[1]
[1]*Victoria University, Australia*

This study shows how an optimisation model/ DEA can be applied to Corporate Social Responsibility in the company-wide capability for people, processes, and resources to meet social obligations to all stakeholders under the guise of corporate citizenship. The data used are the sanitized scores of the empirical results from an Australian bank study. The DEA model was able to identify 11 decision making units, from a cohort of 231, that were leading exponents of the behavioural characteristics required to be rated 100% for satisfying corporate social responsibility criteria. The firm could use such findings to investigate why these units succeeded so well when others floundered and this analysis can provide valuable information for developing an efficient organizational structure for the company for achieving good corporate governance.

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| **Session** | Operations Research 3 |
| **Date** | 12/9/2009 |
| **Time** | 15:30 - 17:00 |
| **Room** | Montparnasse I |
| **Chairs** | Kenneth Sorensen, Roel Leus |

**Impact of Initial Wealth on Newsvendor Problem with S-Shaped Utility**
Wei Geng[1], Xiaobo Zhao[1]
[1]*Tsinghua University, China*

The bounded rationality of human behaviors in decision making can be characterized by an S-shaped utility function. We discuss a newsvendor problem with an S-shaped utility. It is shown that the expected utility of the final wealth is unimodal, based on which an optimal policy can be obtained. The impact of initial wealth is investigated and some structural properties of the optimal policy are given. Numerical examples illustrate the results.

**A Two Step Approach Including Scatter Search Algorithm for the Integrated Procurement, Production and Distribution Planning**
Ahmad Reza Pourghaderi[1], Seyed Ali Torabi[1], Saeideh Sekhavat[2]
[1]*University of Tehran, Iran*
[2]*University of Isfahan, Iran*

This paper proposes a new multi-site production planning model integrating procurement and distribution plans in a multi-echelon supply chain network including routing and fleet sizing problems as well as an advanced discount policy. A two step solution approach including scatter search (SS) algorithm is proposed in order to cope with these issues. The proposed model and solution method are validated through some numerical tests inspired by an automobile manufacturing company.

**A Chance-Constrained Programming of Fourth-Party Logistics Routing Problem with Fuzzy Duration Time**
Yan Cui[1], Min Huang[1], Xingwei Wang[1], Loo Hay Lee[2]
[1]*Northeastern University, China*
[2]*National University of Singapore, Singapore*

In the last ten years, Fourth Party Logistics (4PL) has been attracting more and more attention in many relative fields. In this paper, a 4PL Routing Problem (4PLPR) with fuzzy duration time is presented where the fuzzy numbers is used to describe the uncertainty of the duration time. After the description of 4PLRP, a chance-constrained programming for it is established according to the credibility theory. And a crisp equivalent is derived when fuzzy variables are characterized by triangular fuzzy numbers. Then genetic algorithm embedded K shortest path algorithm with special initialization is designed. Finally, an extensive computational analysis is presented and the numerical results show that which route should be selected in order to get minimum cost in the due date.

**A Non-Oscillating Beam-Search with a Look-ahead for the Circular Packing Problem**
Hakim Akeb[1], Mhand Hifi[2], Rym M'Hallah[3]
[1]*ISC Paris School of Management, France, Metropolitan*
[2]*Univesité de Picardie Jules Verne, France, Metropolitan*
[3]*Kuwait University, Kuwait*

This paper addresses the circular packing problem (CPP) which consists in packing n circles Ci of known radius $r_i$, i belongs to N={1,...,n}, into the smallest containing circle C of radius r. The objective is to determine the radius r as well as the coordinates (xi, yi) of each circle Ci. This problem is solved via a binary search that evaluates the solution using a non-oscillating beam search with separate beams (instead of pooled ones). This beam search guarantees a monotonic decrease of r as the beam width increases. A node of level l of the beam search tree represents a partial packing of l circles into C. The potential of each node of the tree is assessed via a look-ahead strategy. The computational results on different benchmark instances show the effectiveness of the algorithm.

**Reference Effect and Inventory Constraint on Optimal Pricing for Daily Perishable Products**
Takeshi Koide[1], Hiroaki Sandoh[2]
[1]*Konan University, Japan*
[2]*Osaka University, Japan*

This paper considers a discount pricing problem for a monopolist firm which sells daily perishable products. The products are marked down at the end of day when they are likely to be unsold in order to increase the day's revenue of the firm. The discount sale, however, drops consumers' reference prices, with which the consumers judge if a selling price is a gain or a loss for them. The declined reference price reduces the demand for the products sold at a regular price, which is called the reference effect on demand. This paper has formulated the discount pricing problem with reference effects and an inventory constraint to derive an optimal pricing computed by dynamic programming. Numerical experiments have illustrated that the amount of predicted unsold products significantly influences the optimal pricing policy.

**Application of Evolutionary Computing on Least-cost Water Distribution Network Designs**
Min-Der Lin[1], Chien-Wei Chu[1], Gee-Fon Liu[1], Zong-Hua Wu[1], Shuang-Fu Yeh[1]
[1]*National Chung Hsing University, Taiwan*

The optimization of water distribution networks are complex, multi-modal and discrete-variable problems that cannot be easily solved with conventional optimization algorithms. This study adopts ant algorithm (AA), immune algorithm (IA), and scatter search (SS) which are all evolutionary computing techniques to avoid the entrapments by local solutions, to obtain the least-cost designs of water distribution networks. One benchmark water distribution network optimization problems is used as a case study. Comparisons of the results of this study with relevant literature data indicate that AA and SS are able to find solutions better than those provided by some of the most competitive algorithms published in the literature. Furthermore, the results of the success rate evaluation indicate that AA can 100% successfully achieve the global optimum.

**Development of Queuing Models with Balking and Uncertain Data using Fuzzy Set Theory**
David de la Fuente[1], Maria Jose Pardo[2]
[1]*Oviedo University, Spain*
[2]*Basque Country University, Spain*

In this work we develop three queuing models with balking in which we incorporate an uncertain distribution of balking using Fuzzy Set Theory. For the study and analysis of the models, we take as a starting point the queuing model with balking development by Saaty from the models of Homma and Finch. In order to verify the validity of the proposed methodology, we calculate the performance measures in three queuing models with balking: the queuing model with possibilistic distribution of balking, the queuing model with distribution of balking based on triangular fuzzy number and the fuzzy queuing model with possibilistic balking and uncertain parameters. The proposed technique is suitable for the performance evaluation of queuing models with balking where the accurate data are not available and need to be approximated by fuzzy values, and it provides engineers with more useful information about the possible system behavior.

**Some New Models for Capital Budgeting: Realistic Representations of Financial Decision Making by Firms**
Bruce Craven[1], Sardar Islam[2]
[1]*University of Melbourne, Australia*
[2]*Victoria University, Australia*

Traditional capital budgeting models are extended for realistic representations of financial decision making by firms in the conditions for common and interdependent projects, termination of projects when these are significant set up costs for new projects, conditions for sustainability of the business when some projects may collapse, and constraints on borrowing.

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| **Session** | Quality Control and Management 1 |
| **Date** | 12/9/2009 |
| **Time** | 11:00 - 12:30 |
| **Room** | Montparnasse II |
| **Chairs** | Flavio Fogliatto, Yi-Hui Liang |

**Proposed Xbar and S Control Charts for Skewed Distributions**
Michael Boon Chong Khoo[1], Abdu Mohammed Ali Atta[1], Chen Chung-Ho[2]
[1]*Universiti Sains Malaysia, Malaysia*
[2]*Southern Taiwan University, Taiwan*

This paper proposes a weighted variance method to compute the limits of the and S charts for skewed distributions. The proposed charts extend the weighted variance and R charts in [1] by enabling a process from a skewed distribution with moderate and large sample sizes to be monitored efficiently, hence producing more favourable Type-I and Type-II error rates than the charts in [1]. Note that the charts in [1] are only intended to be used for small sample sizes. The Type-I and Type-II error rates computed show that the proposed charts outperform the existing heuristic charts, as well as those in [1] for moderate and large sample sizes, involving cases with known and unknown parameters, when the distribution of a process is skewed.

**Software Security Characteristics for Function Point Analysis**
Nur Atiqah Sia Abdullah[1], Rusli Abdullah[2], Mohd Hasan Selamat[2], Azmi Jaafar[2]
[1]*Universiti Teknologi MARA, Malaysia*
[2]*University Putra Malaysia, Malaysia*

Software cost estimation (SCE) has been an important but difficult task since the beginning of the computer era. It considers list of parameters to estimate accurately the software cost. However, security cost is always excluded in most of the parametric cost estimation models. It is because of the security aspect is normally considered late in the software development. To overcome this problem, we proposed an enhancement to one of the parametric estimation models, which is Function Point Analysis (FPA), to address the security concerns. The enhancement suggests potential software security characteristics during system development life cycle (SDLC). These characteristics are then integrated into FPA calculation to encounter the security cost estimation. This paper also points to the validation of a survey findings and calibration of the FPA calculation.

**A Technical Framework of the Taguchi System Design Method Based on Axiomatic Design and TRIZ**
Yihai He[1], Zhao Ma[1], Wenbing Chang[1]
[1]*Beijing University of Aeronautics and Astronautics, China*

70-80% of product quality is determined in the concept design process, concept design stage has become the "bottleneck" of the lifecycle quality control. Taguchi method is an effective design quality control approach, its focuses are on the parameter and tolerance design, and there is short of technique solution for system design. In this paper, based on the design axiom of Axiomatic Design (AD) and solution to contradictions in Theory of Inventive Problem Solving (TRIZ), a technical framework of Taguchi system design is put forward. The framework is a component of an evaluation method of product scheme based on AD and a solution flow of latent design contradictions based on TRIZ, and thus it can identify and solve the latent coupling defects laid in design scheme. Finally, a typical mechanical product design example is provided to validate the effectiveness and correctness of this technical framework.

**Interoperability of QFD, FMEA, and KCs Methods in the Product Development Process**
Alaa Hassan[1], Ali Siadat[1], Jean-Yves Dantan[1], Patrick Martin[1]
[1]*Arts et Métiers ParisTech, France*

Current market conditions require design and manufacturing companies to continuously increase product functionality, reduce design cycles, decrease cost and improve quality. Today, there are many quality methods but the links allowing the passage from a method to the other are not well defined and the designer does not have a global vision of these methods in the product lifecycle. To improve the product quality, it's necessary to reveal the relations between these methods. This paper studies three of the most popular quality methods: Quality Function Deployment (QFD), Failure Modes and Effect Analysis (FMEA), and Key Characteristics (KCs) methods. It analyses the complementarity and the inter-relations among them and presents an activity diagram that shows their interoperability. An example of a car door is presented to illustrate our proposal. Finally, an information model is proposed to formalize these methods in a common framework in order to support the quality team work.

**An Advanced CUSUM Chart for Attributes**
Yanjing Ou[1], Roger Jiao[2], Zhang Wu[1]
[1]*Nanyang Technological University, Singapore*
[2]*Georgia Institute of Technology, United States*

This article studies a unique feature of the binomial CUSUM chart in which the difference (dt – d0) is replaced by (dt – d0)2 in the formulation of the cumulative sum Ct (where dt and d0 are the actual and in-control numbers of nonconforming units, respectively, in one sample). The results of the performance studies reveal that this new feature is able to increase the detection effectiveness when fraction nonconforming p becomes three to four times large as the in-control value p0.

**A CUSUM Chart Using Absolute Sample Values to Monitor Process Mean and Variance**
Zhang Wu[1], Mei Yang[1]
[1]*Nanyang Technological University, Singapore*

In Statistical Process Control (SPC), when dealing with a quality characteristic x that is a variable, it is usually necessary to monitor both the mean value and variability. By inspecting the absolute value of sample mean shift, a single CUSUM chart (called the ABS CUSUM chart) has been devised by an optimization algorithm and fully investigated for this purpose. The optimization algorithm (called the holistic algorithm) facilitates the determination of the charting parameters of the charts and increases their overall detection effectiveness. The results of performance studies show that the overall performance of the ABS CUSUM chart is as good as an optimal 3-CUSUM scheme (a scheme incorporating three individual CUSUM charts). However, since the ABS CUSUM chart is easier for implementation and design, it may be more suitable for many SPC applications in which both mean and variance of a variable have to be monitored.

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| **Session** | Quality Control and Management 2 |
| **Date** | 12/9/2009 |
| **Time** | 13:30 - 15:00 |
| **Room** | Montparnasse II |
| **Chairs** | Michael Boon Chong Khoo, Panagiotis Trivellas |

**A Support Vector Machine-Based Pattern Recognizer Using Selected Features for Control Chart Patterns Analysis**
Chuen-Sheng Cheng[1], Hui-Ping Cheng[2], Kuo-Ko Huang[1]
[1]*Yuan-Ze University, Taiwan*
[2]*MingDao University, Taiwan*

In this paper we review two implementation modes of control chart pattern recognition and introduce a new research problem concerning pattern displacement problem in the "recognition only when necessary" mode. A set of features are developed by taking the pattern displacement into account. Simulation studies indicate that an SVM-based pattern recognizer with features as input vector performs significantly better than that of using raw data as inputs.

**A MEWMA Chart for a Bivariate Exponential Distribution**
Yujuan Xie[1], Min Xie[1], Thong Ngee Goh[1]
[1]*National University of Singapore, Singapore*

Control charts as one of the most well-known statistical process control (SPC) techniques have shown to be effective in process monitoring. Most of the existing studies in the area of the time-between-event (TBE) control charts have been focused on the univariate cases. In this paper, a MEWMA chart is constructed for monitoring the mean vector of the Gumbel's bivariate exponential TBE model. The average run length profile of the proposed chart is studied using simulation. Some guidelines for setting up an optimal MEWMA chart are provided. Finally, a numerical example is given to show the effectiveness of the MEWMA chart.

**Interpreting the Mean Shift Signals in Multivariate Control Charts Using Support Vector Machine-based Classifier**
Chuen-Sheng Cheng[1], Hui-Ping Cheng[2], Kuo-Ko Huang[1]
[1]*Yuan-Ze University, Taiwan*
[2]*MingDao University, Taiwan*

Out-of-control signals in multivariate charts may be caused by one or more variables or a set of variables. One of the challenges in multivariate process control is the interpretation of an out-of-control signal. The diagnosis of out-of-control signal is formulated as a classification problem. The proposed system includes a shift detector and a classifier. The traditional multivariate chart works as a mean shift detector. Once an out-of-control signal is generated, an SVM-based classifier is used to recognize the variables that have shifted. We propose using subgroup data and extracted features (sample mean and Mahalanobis distance) as the inputs. The results reveal that SVM using extracted features as inputs performs better than using raw data as inputs.

**Multivariate Statistical Control of Batch Processes with Variable Duration**
Flavio Fogliatto[1], Ndeye Niang[2]
[1]*Federal Univ of Rio Grande do Sul, Brazil*
[2]*Conservatoire National des Arts et Metiers, France*

Batch processes are widely used in several industrial sectors. In those processes performance is described by variables which are monitored as the batch progresses, typically using control charts based on multiway principal components analysis (CCPs). Here we investigate the special case of batches with variable duration, which cannot be directly monitored using CCPs. We propose a new quality control strategy for monitoring such batches which are not aligned or time warped with respect to their trajectories, but are rather completed using an alternative scheme such that all information on the variability in batch profiles along the time axis is preserved. The completed data set is reduced using the Statis method and monitoring of batch performance is accomplished directly on principal plane graphs, from which non-parametric control charts are derived.

**The Link Between Total Quality Management and Organizational Performance in Malaysian Automotive Industry: The Mediating Role of ISO/TS16949 Efforts**
Norhayati Zakuan[1], Sha'ri Mohd Yusof[2], Awaluddin Mohd. Shaharoun[3]
[1]*University of Tun Hussien Onn, Malaysia*
[2]*Universiti Teknologi Malaysia, Malaysia*
[3]*University of Technology Malaysia, Malaysia*

The principle aim of this article is to determine the impact of total quality management (TQM) and ISO/TS16949 efforts on organizational performance of Malaysian automotive industry. Based on theoretical considerations, a model is proposed linking the TQM constructs and ISO/TS16949 efforts to the organizational performance. Exploratory factor analyses and reliability analysis empirically verified and validated the underlying items of TQM, ISO/TS16949 and organizational performance. Structural equation modeling was employed to test the model drawing on a sample of 161 Malaysian automotive industries. Data analysis reveals that, TQM implementations have a strong and positive impact on organizational performance through direct relationship and also through a mediating role of ISO/TS16949 efforts.

**Enhancing Organizational Quality Efforts through Incorporating of Motivational Aspects**
Alexander Nielen[1], Sebastian Vetter[1], Helmut Lieb[1], Christopher M. Schlick[1], Robert Schmitt[1]
[1]*RWTH Aachen University, Germany*

The objective of this paper is to examine the impact of motivational factors on the perceived state of quality management systems (QMS) within four small and medium sized companies from different industries in Germany. Although extensive research on motivational factors has been carried out in the last decade, none acknowledges the interrelation between the perceived status of a QMS and the existence of inherent motivational factors in everyday work routine. Therefore, the approach presented in this paper focuses on the emergence of relevant factors to investigate potential interdependencies. It was found that supervisor support is the most successful driven factor to contribute to a positive attitude towards organizational quality efforts (OQE). Moreover, exposure to stress is another important factor to cause positive or negative feelings towards OQE. The overall empirical results indicate a positively rated QMS if motivational factors are inherent in everyday work routine.

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| **Session** | Quality Control and Management 3 |
| **Date** | 12/9/2009 |
| **Time** | 15:30 - 17:00 |
| **Room** | Montparnasse II |
| **Chairs** | C.K. Kwong, Jianjun Wu |

**A Research of Using MDM System for Increasing Data Quality and Property to Make Effective Business System in Company**
SungWoo Kang[1], SunIl Oh[1], JoongHyun Cho[1]
[1]*Myongji university, South Korea*

Systems help the companies maintain the competitiveness by supporting the overall activities of the company including the both direct management activities such as manufacturing and sales and indirect management activities such as planning, finance and so on. However, fragmental increase of the efficiency is worsening the management in the long term. The efficiency in manufacturing and in resources management is conflicting with each other. As a result, there is a conflict between sales and purchase as well and eventually, cost increase is taking place instead of profit maximization.
MDM clarifies the standard information valuable for the whole company. It maintains the quality and objectiveness of the information while modifying the information suitable for the company environment to sustain the reality. It uses decentralized data system to make standard information or all the information systems received information via MDM to be ensured of the suitability and reliability of the data.

**An Enhanced Residual MEWMA Control Chart for Monitoring Autocorrelated Data**
Giovanna Capizzi[1], Guido Masarotto[1]
[1]*University of Padua, Italy*

One approach for monitoring autocorrelated data consists in applying a control chart to the residuals of a time series model. However, due to the so called "forecast recovery", the response to a mean shift in the observed process can appear attenuated in the residual series, in particular, after a short transient phase. To try to overcome this problem, we suggest a simple modification of the standard residual Multivariate Exponentially Weighted Moving Average (MEWMA) control chart which reduces the "forecast recovery" effect. Comparisons, based on two real industrial process models, show that the proposed modification can enhance the ability of the MEWMA control chart to detect both small and medium mean shifts.

**TQM and Innovation Performance in Manufacturing SMEs: The Mediating Effect of Job Satisfaction**
Panagiotis Trivellas[1], Ilias Santouridis[1]
[1]*Technological Education Institute of Larissa, Greece*

This paper outlines the critical role of employees' job satisfaction in the link between TQM and innovation performance. The discussion arises primarily based on the considerable controversy concerning this relationship that appears in the literature. As of interest to resolve this controversy, a research framework is developed in which job satisfaction acts as the mediator between TQM and firm's innovation performance. The empirical findings from a survey of 90 manufacturing SMEs in Greece confirmed that job satisfaction exerts a mediating effect on the relationship between TQM and innovation. A TQM approach which emphasizes mainly to "soft" issues such as continuous training, performance-based rewards, teamwork and empowerment is necessary to foster job satisfaction that is conducive to innovation. Furthermore, "hard" TQM elements such as process and quality management, and information analysis facilitate at a lesser degree firm's innovativeness only through job satisfaction.

**A Taguchi Method for Safety Design of Artificial Marble Products**
Wen-Pai Wang[1], Chung-Shang Chang[2], Yu Hsiu Lee[1]
[1]*National Chin-Yi University of Technology, Taiwan*
[2]*Chienkuo Technology University, Taiwan*

Artificial marble products usually include sinks and kitchen equipments. Frequent accidents of consumer injuries caused by fallen sinks have been reported. This study aims to enhance the safety of marble sink by taking into the consideration of not increasing the cost of production and materials, and by applying the parameter design of Taguchi Method in selecting six controllable factors: defoaming time, resin ratio, hardener amount, oven time, oven temperature and amount of transparent glue. Eventually by formulating the optimal combination of production parameters, and by adjusting the raw materials and process, human injuries resulted from broken sink shreds may be avoided. All confirmation experiments conducted by parameter level fall within the confidence interval, indicating the parameter design of this study can actually attain the ultimate goal of product safety by effectively enhancing product quality without increasing any related costs.

**Adimax Chart for Monitoring Univariate Processes**
Harikrishnan Kanthen K[1], Chinna Karuthan[2], Krishna Guru Balachander[3]
[1]*Nottingham University Malaysia Campus, Malaysia*
[2]*University Technology MARA, Malaysia*
[3]*Monash University Malaysia, Malaysia*

First developed by Shewhart, the use of x bar and R (or x bar and S) charts has become a standard practice in industrial applications. Recent developments deviate from early ones most notably on the emphasis they place on target values and on simultaneously monitoring both the process mean and process variability in a single chart. The ADIMAX Chart is an innovative simultaneous statistical process control chart for univariate processes. This chart is easy to construct and interpret even by the SPC illiterate.

**Supplier Evaluation with Quality-Based Fuzzy Data**
Ching Yi chiang[1], Ming-Hung Shu[1]
[1]*National Kaohsiung University of Applied Sciences, Taiwan*

Supplier evaluation and selection is one of the most critical activities of purchasing management in a supply chain. On the regular basis, managers constantly evaluate quality characteristics of suppliers' products and make decisions to select preferred suppliers. Fuzzy quality data commonly exists in the reality world. Under this fuzzy environment, we propose a quality-based supplier evaluation based on the fuzzy-capability index (FCI) in this paper. We first apply the resolution identity theorem to construct the membership function of FCI for each supplier. With these FCIs' membership functions, a ranking method known as a fuzzy preference relation of FCI is then adopted to select the preferred suppliers. Finally, a case study of touch screens is provided to illustrate the applicability of incorporating the fuzzy quality data into the problem of quality-based supplier evaluation and selection.

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| **Session** | Supply Chain Management 1 |
| **Date** | 12/9/2009 |
| **Time** | 11:00 - 12:30 |
| **Room** | Montparnasse III |
| **Chairs** | Ali Diabat, Van-Dat Cung |

**An Empirical Investigation of RFID Adoption and Improving Process Performance in the Manufacturing Supply Chain**
Wei Chen Tsai[1], Ling Lang Tang[2]
[1]*Aletheia University, Taiwan*
[2]*Yuan Ze University, Taiwan*

Advances in information technology and the globalization of enterprises are both realities and opportunities of the twenty-first century. This article aims to examine the framework of radio frequency identification technology adoption and improving process performance in the Manufacturing Supply Chain. The research based on IT adoption literatures to explore the related factors of Radio Frequency Identification (RFID) application. In a word, this study differs crucially from previous research, the study (1) addresses interactive firm behaviors in RFID adoption and highlights the value of performance, (2) identifies related constructs of RFID adoption included the industry competition, innovation characteristics as technological complexity and compatibility and cost, and (3) provides research suggestions in RFID adoption behavior and performance focus on efficiency and value for the data collected with 161 manufacturing firms. Thus, we hope the final result is useful to educational circles and practice.

**An Exploratory Study of Purchasing and Supply Management in Hong Kong Industries**
Antonio Ka Wing Lau[1], Susan To[2], Richard Yam[2]
[1]*Institute of Supply Management Hong Kong, Hong Kong*
[2]*City University of Hong Kong, Hong Kong*

The importance of Purchasing and Supply Management (PSM) for business performance has received considerable attention in recent years. However, academic research on PSM training and education is not well conducted. This paper presents the initial findings from PSM practitioners in Hong Kong about the current PSM training and education needs. The study identifies top five trends, skills and knowledge level required for the PSM professionals. The results show that the trends of PSM focus on purchasing cost reduction, the skills on negotiation and communication, and the knowledge on supply analysis and relationship management. The study also identifies that companies tend to adopt on-the-job training for the PSM staff but lack systematic PSM training approach. This paper provides empirical evidence on the recent PSM environment and training needs.

**Accountability-based Reengineering of an Order Fulfillment Process**
Linda Zhang[1], Roger Jiao[2], Qinhai Ma[3]
[1]*University of Groningen, Netherlands*
[2]*Georgia Institute of Technology, United States*
[3]*Northeastern University, China*

In view of the dynamic changes in a supply chain network and the significance of order fulfillment processes (OFPs) for the successful implementation of supply chain management, this paper puts forward an accountability-based methodology for companies to reengineer OFPs while considering both external and internal changes. In the methodology the accountability centered approach and the simulation technique are adopted to exploit feasible solutions and determine an optimal one, respectively. A case study in a semiconductor equipment manufacturer is reported to demonstrate the potential and feasibility of the proposed methodology.

**The Effect of Model Change from Direct to Distribution on Buyer-Supplier Behavior and Relationship**
Xiaocui Jiang[1], Haiqi Wang[1], Qiang Lu[1], Xiaoling Zhang[1]
[1]*Harbin Institute of Technology, China*

This paper explores the effect of model change from direct to distribution on the behavior of buyer and supplier and their relationship. First, a theoretical framework is established to investigate the effect of model change based on literature review. Then, a case study is presented to illustrate the developing relationship between a world-class American company and its Chinese suppliers. Finally, comparisons between actual report and theoretical outcomes show that the results are consistent. The results indicate that (1) suppliers' performance declines while the business model is shifting from direct model to distribution model, (2) the buyer-suppliers relationship is not as close as before, and (3) the power of buyer over suppliers declines. However, these effects may be mitigated through applying some integration and collaboration methods from the viewpoint of the overall supply chain.

**TIME for Performance Improvement: Targeting Innovation in Manufacturing Engineering**
Susan Morton[1], Roula Michaelides[2], Neil Burns[1], Chris Backhouse[1]
[1]*Loughborough University, United Kingdom*
[2]*Liverpool University, United Kingdom*

Performance improvement capability is related to an organization's ability to utilize a fundamental asset, the knowledge that resides with its employees, together with learning from past projects and having good links to external knowledge sources. Firms that develop mechanisms to encourage conversation between individuals and teams to take place, particularly in today's post job security economic climate, can witness performance improvement at the individual and team level, and thence to the overall performance of the organization. This paper reports on performance improvement work that is taking place with the case study company, a post-lean organization, in order to develop its capacity for team and organizational learning and improve its performance in the global marketplace.

**The Analysis of Decision-making of Investing in the Bi-national Marketing Channel with Game Options**
Tyrone T. Lin[1], Shih-Ting Wang[1]
[1]*National Dong Hwa University, Taiwan*

This study uses the mathematical model of game options to analyze when the distributors of the two countries choose to invest in the domestic or international marketing channel, they will consider competitors' behavior and invest in the marketing channels of the two countries based on the optimal time point. The results will provide distributors with the references of evaluating the influence of the potential channel value on the firm value and deciding whether to enter the international marketing market when they want to invest in the multi-national marketing channel in the future.

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| **Session** | Supply Chain Management 2 |
| **Date** | 12/9/2009 |
| **Time** | 13:30 - 15:00 |
| **Room** | Montparnasse III |
| **Chairs** | Linda Zhang, Nermine Harraz |

**An Efficient Multiobjective Evolutionary Approach for a Simultaneous Inventory Control and Facility Location Problem**
Shu-Hsien Liao[1], Chia-Lin Hsieh[2], Wen-Min Chou[2]
[1]*Tamkang University, Taiwan*
[2]*Aletheia University, Taiwan*

Supply chain network system provides an optimal platform for efficient and effective supply chain management (SCM). SCM usually involves multiple and conflicting objectives. A Multi-Objective Location Inventory Problem (MOLIP) model is initially formulated that includes elements of total cost, volume fill rate and responsiveness level as its objectives and also integrates the effects of facility location, distribution, and inventory issues. In this paper, we presented a hybrid evolutionary algorithm based on the Nondominated Sorting Genetic Algorithm (NSGA2) for solving MOLIP. We analyzed a randomly generated set of problem instances of the MOLIP model to understand the model performance and compared this algorithm with one of the well-known multiobjective evolutionary algorithms called SPEA2 to understand the efficiency between two approaches. Computational and comparative results of our NSGA2-based algorithm have presented promise solutions for different sizes of problems and proved to be an innovative and efficient approach for so called difficult-to-solve problems.

**Assessing Flexibility in Supply Chain Using Adaptive Neuro Fuzzy Inference System**
Hosein didekhani[1], Javad Jassbi[1], Nazanin Pilevari[1]
[1]*Islamic Azad University, Science & Research Branch, Iran*

Supply chain flexibility assessment (SCFA) has been considered as a major determinant of competitiveness in world class manufacturing. The environmental issues as well as speed, variety, flexibility and integration in production line come along with customer relationship and mass customization concept should come to light in today's research studies. To achieve competitive edge, companies must align with suppliers and customers to streamline operation as well as flexibility characteristics beyond individual companies. How ever, so far a little effort has been made to assess flexibility in recent years. Therefore, due to ambiguity of flexibility assessment an ANFIS model has been developed for evaluating flexibility in supply chain, considering flexibility attributes such as operation, new product and responsiveness. This evaluation helps managers to perform gap analysis between existent flexibility level and the desired one.

**Optimization Modeling of An Integrated Supply Chain Network**
Ali Diabat[1], Jean Philippe Richard[2]
[1]*Masdar Institute of Science and Technology, United Arab Emirates*
[2]*University of Florida, United States*

In this paper, we develop a novel multi-echelon joint inventory-location problem that considers location and inventory decisions simultaneously. The model deals with the distribution of a single commodity from a single manufacturer to a set of retailers through a set of sites where distribution centers can be located. The retailers face deterministic demand and hold working inventory. We assume single sourcing in which the entire demand of a given retailer is served by a single distribution center. The distribution centers order a single commodity from the manufacturer at regular intervals and distribute the product to the retailers. The distribution centers, also, hold working inventory representing product that has been ordered from the manufacturer but has not been yet requested by any of the retailers. Lateral supplies among the distribution centers are not allowed. The problem is formulated as a nonlinear mixed-integer program. Model validation and benefit of integration are demonstrated via a numerical study.

**A Carbon-Capped Supply Chain Network Problem**
Ali Diabat[1], David Simchi-Levi[2]
[1]*Masdar Institute of Science and Technology, United Arab Emirates*
[2]*Massachusetts Institute of Technology, United States*

The Kyoto protocol was negotiated as a global effort to reduce greenhouse gas (GHG) emissions.The future standing of companies will be seriously affected by the steps they take today in regards to the environment. Perhaps, if vigilant actions are not taken by a firm then it could easily be left behind in today's highly competitive world. This paper presents a novel optimization model for green supply chain management, which integrates environmental management and its impact into the supply chain while taking carbon emissions into account. The model, which we formulate as a mixed-integer program (MIP), can help to reveal an optimal strategy for companies to meet their carbon cap, while minimizing opportunity cost. We demonstrate the viability of the model via a computational study.

**Optimizing Supply Chain Replenishing Policy for Green Short Life-Cycle Product Considering Ecological Product Design Value, Remanufacturing and Warranty-Dependent Demand**
Chun-Jen Chung[1], Hui-Ming Wee[2]
[1]*Aletheia University, Taiwan*
[2]*Chung Yuan Christian University, Taiwan*

Due to environmental warming and consciousness, business globalization and shortened product life-cycle, numerous attentions have been paid to ecology protection, resource saving and effective operations management. Green product and production processes designs have significant influence on the environment and resource re-usage. The relevant EU regulations, such as WEEE, RoSH and EuP, have been trying to have a friendly way to the earth and reduce the greenhouse effects by controlling the disposals and the gas emission. These green product design and remanufacturing efforts are investigated in the development of an integrated production inventory model with short life-cycle. A numerical example is presented to illustrate the theory.

**A Lost-sale Inventory System with Dual Supply and Multiple Demand Classes**
Yun Zhou[1], Xiaobo Zhao[1]
[1]*Tsinghua University, China*

We deal with an inventory system that serves multiple demand classes and procures from two suppliers. Inventory replenishments and rationing decisions have to be made in each period. We show that the optimal rationing decision is characterized by a set of critical levels, and the optimal decision to replenish from the faster supplier follows a modified base-stock policy. For the optimal decision to replenish from the slower supplier, structural results on monotonicity with respect to the inventory state are derived. We also examine the performances of the system by a numerical experiment.

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| **Session** | Supply Chain Management 3 |
| **Date** | 12/9/2009 |
| **Time** | 15:30 - 17:00 |
| **Room** | Montparnasse III |
| **Chairs** | Carman Lee, Christian-Andreas Schumann |

**A Tree-based Wall-building Algorithm for Solving Container Loading Problem with Multi-drop Constraints**
Li Pan[1], Sydney Chu[1], Guangyue Han[1], Joshua Huang[1]
[1]*The University of Hong Kong, Hong Kong*

This paper presents a container loading algorithm for generating a container truck loading plan for a set of goods to be distributed to different retail outlets in one trip. This is a problem of container loading with multi-drop constraints. According to the destinations and travel plan of the truck, the set of goods items is divided into groups, one for each destination, and the groups are ordered according to the unloading order at the destinations. A general container loading algorithm is revised by replacing the layer loading strategy with a wall loading strategy in order to deal with the order of unloading destinations in the loading plan. The numerical analysis results have shown that the algorithm achieved satisfactory loading results in utilization of container space in comparison with the space utilization by human loading.

**Determining the Storage Location for Outbound Containers in a Maritime Terminal**
Lu Chen[1], Andre Langevin[2]
[1]*Shanghai Jiao Tong University, China*
[2]*Ecole Polytechnique de Montreal, Canada*

This paper addresses storage location assignment problem for outbound containers. The problem is decomposed into two stages. The amount of locations in each block, which will be assigned to the containers bounded for different ships, is determined in the first stage. The exact storage location for each container is determined in the second stage. The problem in the first stage is solved by a mixed integer programming model, while hybrid sequence stacking algorithm is applied to solve the problem in the second stage. Experimental results show that the proposed approach is effective and efficient in solving the storage location assignment problem for outbound containers.

**Economic Production Quantity (EPQ) Deteriorating Inventory Model with Breakdown Machine, Stochastic Repair and Maintenance Time and Lost Sales**
Gede Widyadana[1], Hui-Ming Wee[1]
[1]*Chung Yuan Christian University, Taiwan*

In recent years, many researchers focus their studies on developing practical Economic Production Quantity (EPQ) models. This paper develops an EPQ deteriorating item model with machine breakdown and stochastic repair time. A numerical example and sensitivity analysis are given to illustrate the theory. The results show that production rate and demand rate are the most sensitive parameters to the optimal production period, and demand rate is the most sensitive parameter to the optimal total cost.

**Managing the Complexity of the Supply Chain**
Nunzia Carbonara[1], Ilaria Giannoccaro[1]
[1]*Politecnico di Bari, Italy*

This paper develops a conceptual model to assess the complexity of the supply chain (SC). It is built on the theory on the complex adaptive systems (CASs) and it identifies the main SC features that match the CAS properties. The conceptual framework is used in two case studies that regards the SCs of two Italian firms. The analysis aims at assessing the complexity of the considered SCs as well as at formulating theoretical propositions regarding the SC features and their behaviours.

**State-space Proportional-integral Inventory Replenishment Practices for Bullwhip Effect Investigation in Supply Chains**
Christos Papanagnou[1], Panagiotis Tzionas[1]
[1]*Alexander Technological Institute of Thessaloniki, Greece*

Inventory replenishment practices play significant role in supply chain networks and they are strongly associated with overall supply chain performance. This paper presents a state-space model of a stochastic series multi-node supply chain, controlled via local proportional-integral inventory replenishment policies. The model is triggered by identically distributed and uncorrelated random variables which represent uncertain customer demand. The proposed model is analyzed under stationarity, provided that control parameters belong to a certain range which is clearly specified. Simple recursive techniques are developed to calculate explicitly the associated covariance matrix in closed parametric form. This allows to analyze the effect of control parameters in the inventory practices on the bullwhip effect. It is shown that proportional-integral replenishment practices can be applied to explain in qualitative terms the main performance and stability properties of supply chains.

**Sustainable Recovery Network Design**
Noha Galal[1], Nermine Harraz[2], Nashaat Fors[2], Hamdy Elwany[2]
[1]*Alexandria Higher Institute of Engineering and Technology, Egypt*
[2]*Alexandria University, Egypt*

In order to achieve sustainability the design of the recovery network has to fulfill the different objectives from the economic, social, and environmental perspectives. In this paper a lexicographic integer linear goal programming (ILGP) model is developed to design a multi-commodity recovery network for products of modular structure. The model results in locating facilities in a multi-echelon network and assigning the products to the different end of life (EOL) options.

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| **Session** | Project Management 1 |
| **Date** | 12/9/2009 |
| **Time** | 11:00 - 12:30 |
| **Room** | Montparnasse IV |
| **Chairs** | Simon Philbin, Pandelis Ipsilandis |

**An Empirical Investigation of the Impacts of ERP Consultant Selections and Project Management on ERP IS Success Assessment**

Wen-Hsien Tsai[1], Yu-Shan Shen[1], Pei-Ling Lee[1], Lopin Kuo[2]
[1]*National Central University, Taiwan*
[2]*Tamkang University, Taiwan*

Many companies regard Enterprise Resource Planning (ERP) system implementation as a project management (PM). ERP project implementation is usually costly and time-consuming. To save time and lower the cost, many companies seek for the help from consultants to implement ERP project. Therefore, the selection of ERP consultant turns out to be a key success factor to attain the goal. The ignorance of the various factors of ERP consultant selection will lead to a failure in ERP project implementation. In this study, we will examine the impact of ERP consultant selection factors on ERP project management and the impact of ERP project management on the performance improvement on ERP systems. In the study, ANOVA and Regression analysis were applied to examine the impact of the ERP consultant selection on the ERP project management, and the impact of the ERP project management in the DeLone and McLean's IS success model.

**On Implementation of Waste Management Systems in the Hong Kong Construction Industry using Spectral Methods**

Vivian Tam[1], Khoa Le[1]
[1]*University of Western Sydney, Australia*

The Hong Kong government has implemented various measures for reducing waste generation, including a waste disposal ordinance, a green manager scheme, a waste reduction framework plan, a pilot concrete recycling plant, waste management plans and a landfill charging scheme. However, a large amount of construction and demolition waste is still generated everyday. This paper examines the existing implementation of waste management systems in the Hong Kong construction industry. Questionnaire survey and structured interviews are conducted. Power spectra of the survey data is introduced for assessing the existing implementation. It is found that improving environmental performance is ranked as the least project scope for construction projects. Benefits and difficulties of implementing waste management systems are highlighted. Recommendations to improve the existing implementation of waste management systems are also discussed.

**A Framework for Incorporating Time, Cost, and Fidelity Tradeoffs among Design Assessment Methods in Product Development**

Michael Johnson[1]
[1]*Texas A&M University, United States*

Product development performance is of great importance in the current competitive market. Engineers and managers have a wide array of design tools at their disposal to assess alternative designs and determine their fitness. The selection of assessment methods can have a significant impact on project risk (the failure to meet lead time or budgetary constraints). A framework for evaluating such decisions and tradeoffs for development projects using Monte Carlo simulations and optimization is presented. Case study results show that alternative assessment methods can be used to achieve certain cost, lead time, or certainty goals.

**Comparison of Project Objectives and Critical Factors between DBB and DB in China**

Yongqiang Chen[1], Xingyu Zhu[1], Ning Zhang[1]
[1]*Tianjin University, China*

The selection of project delivery systems is a critical problem for project owners, because it will directly affect the achievement of owner's project objectives. At the beginning, this paper proposes the project objectives of Design-Bid-Build and Design-Build project, and also the factors influencing the selection of Design-Bid-Build and Design-Build. Then, Reliability Analysis and Non-parametric test are adopted to analyze the differences of the project objectives between Design-Bid-Build and Design-Build project, and the differences of the factors that influence the selection of Design-Bid-Build and Design-Build in mainland China. At last, this paper concludes the critical factors that influence the selection of Design-Bid-Build and Design-Build.

**Application of Structural Equation Modeling to Assign the Weights for Evaluation Indexes of Brownfield Development Project**

Yuming Zhu[1], Haitang Su[1], Quan Pan[1], Peng Guo[1], Mingjie Yu[1]
[1]*Northwestern Polytechnical University, China*

With application of the structural equation modeling, the weights of criteria and indicators of evaluation index system of brownfield redevelopment project are assigned by calculating the factor loading of the model. The fit index of the model, such as RMSEA (Root Mean Square of Approximate Error), IFI (Incremental Fit Index), CFI (Relative Fit Index), and NNFI (Non-standard Fitting Index)are tested to verify the rationality of the model, which is very important to structural equation modeling with employment in weight assignment work.

**Research on Project Portfolio Selection and Decision-making Process Based on Lotka-Volterra Model**

Peng Guo[1], Junfei Hu[1], Nvzhao Pan[1], Yuming Zhu[1]
[1]*Northwestern Polytechnical University, China*

Based on Lotka-Volterra model, a congener competitive project portfolio selection model with project inter-relationships is built up. To simplify the project portfolio decision-making, an improved decision-making process under LVPPS model is proposed and described specifically through an example. Project portfolio selection and scale decision are included in the same analytical framework.

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| **Session** | Project Management 2 |
| **Date** | 12/9/2009 |
| **Time** | 13:30 - 15:00 |
| **Room** | Montparnasse IV |
| **Chairs** | Vivian Tam, Yong Qiang Chen |

**IS Development Activities and Methodologies in Practice: A Survey of the IT Sector in China**
Bo Yan[1], Younes Benslimane[2], Zijiang Yang[2]
[1]*Beijing Institute of Technology, China*
[2]*York University, Canada*

This paper focuses on activities and methodologies for Information Systems (IS) development projects in China. It examines key issues affecting IS development activities and investigates possible differences in practices and experiences that may result from the adoption of formal development methodologies. A survey of 73 senior Information Technology (IT) professionals helped identify the lack of rigorous testing, the shortage of programming skills and the problematic elicitation of system requirements as the top three issues facing IS development projects. Findings show also that formal development methodologies can affect the percentage of time allocated to each IS development activity and can improve the level of success of such projects. The implications for research and practice are discussed.

**The Study on Paradigm Shift of Project Management Based on Complexity Science –Project Management Innovations in Shanghai 2010 EXPO Construction Program**
Qinghua He[1], Weiping Jiang[1], Yongkui Li[1], Yun Le[1]
[1]*Tongji University, China*

Theory studies and practice at home and abroad indicate that traditional project management shows limitations and inadaptability in dealing with large-scale complex project. So the paradigm of project management should be changed. After research on the complexity of large-scale project, analyze project management paradigm under the background of complexity science and put forward to the direction of paradigm shift. At last, explain project management innovations in Shanghai 2010 EXPO construction program, and reveal the new trend of large-scale complex project management in China.

**Investigation of a Systems-Based Design and Planning Approach to a Facilities Development Project**
Simon Philbin[1]
[1]*Imperial College London, United Kingdom*

This paper describes a new approach to project design and planning that is being developed at Imperial College London. The management framework is based on the use of systems engineering methodologies and has been applied to the design and planning stages for a new high pressure research facility being established at Imperial College. The model includes integrated system design, systems architecture, systems integration and system-of-systems frames that are supported by the enterprise and systems theory levels. Application of the model to the case study investigation revealed how different systems techniques can be utilized as part of an overall management approach, thereby reducing technical uncertainties in the crucial early stages of engineering projects.

**Risk Classification of Projects in EU Operational Programmes According to Their S-curve Characteristics. A Case Study Approach**
Pandelis Ipsilandis[1]
[1]*Technological Education Institute of Larissa, Greece*

The project portfolios of EU programme organizations typically contain hundreds or even thousands of diverse projects, carried out by public or private organizations with diverse level of organizational project management maturity. As a result an embedded risk exists regarding the allocation of funds to potential project organizations that could lead to high opportunity costs from not being able to fully utilize the programme's available funds. Spotting early signs of underperformance is crucial for programme managers in their decision making regarding the implementation of corrective action, or reallocation of funds. Reduction of this type of risk can only be achieved by establishing of the cost progress of each project against its approved budget.
This paper presents a methodological framework applied to a real case study where projects can be classified according to the shape of their S-curve in a way that provides a strong indication about their final performance.

**Designing a Multi Criteria Evaluation Model for Project Teams**
Chang-Lin Yang[1], Rong-Hwa Huang[1], Jin-Ja Ho[1]
[1]*Fu Jen Catholic University, Taiwan*

This study attempts to provide a target to assist project teams in conducting measurements of a business, then estimating and getting over with those latent problems. Business and project managers can select the administers with specific abilities that fit new project characters, and thus can understand the professional skills of the project team and reinforce areas of weakness, helping prevent the team from committing the same errors then improving the outcomes of implementing projects in business. This study focuses on the model for evaluating the effects of project team building, and contains three dimensions (namely Project Planning, Project Execution and Control, Knowledge System Building) and 65 criteria. This study uses the Analytical Network Process (ANP) to determine the importance of the weights for each dimension, strategic subject and measurement indicator.

**An Optimal Coordination Method for Software Development**
Suxiu Xu[1], Zhuoxin Li[1], Qiang Lu[1], Gang Li[1], Li Huang[1]
[1]*Harbin Institute of Technology, China*

The problem of coordinating activities while developing large software systems is challenging. In this paper, we formulate a quantitative coordination model to analyze the optimal management policy for incremental software development. Then we develop an effective solution procedure with polynomial complexity to solve the model. Numerical studies show: (1) too large a team size is counter- productive resulting intensive communication overhead; (2) higher level of product structural complexity and communication efficiency favor more development cycles; (3) higher changeover costs and tighter schedule compression discourage more development cycles; (4) communication efficiency has no great impact on the optimal coordination policy but induces great overhead; (5) the optimal number of modules released reveals a U-shape characteristic. Case study shows that communication costs, module integration costs and system integration costs can be greatly reduced through the use of an optimal coordination policy.

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| **Session** | Project Management 3 |
| **Date** | 12/9/2009 |
| **Time** | 15:30 - 17:00 |
| **Room** | Montparnasse IV |
| **Chairs** | Michael Johnson, Arik Sadeh |

**Resource-constrained Scheduling of a Real Project from the Construction Industry: A Comparison of Software Packages for Project Management**
Norbert Trautmann[1], Philipp Baumann[1]
[1]*University of Bern, Switzerland*

Commercial software packages for project management apply proprietary, heuristic procedures for resource-constrained scheduling. We analyze the scheduling performance of seven such packages. Three of them offer the possibility to select the priority rule to be used for the resource-constrained scheduling procedure. The project duration obtained strongly depends on this rule. Some packages know several thousand priority rules; in general, it is impossible to predict which rule provides the best result for a given project.
By analyzing 1560 projects of an internationally recognized benchmark library, we propose a set of three rules for each package. We apply these rules to a real project from the construction industry. For each of the three packages, the project duration obtained by this set of rules is among the best results for all available rules, and is shorter than the project duration obtained by the packages which do not offer alternative priority rules.

**Towards an Outcome Based Project Management Theory**
Ofer Zwikael[1], John Smyrk[1]
[1]*The Australian National University, Australia*

The importance of projects to improve operations management continues to gain wide acceptance. However, although all projects are approved in order to achieve outcomes (benefits) defined by the project funder, project management is often perceived by organisations as a process aimed at generating a unique output. While output delivery can still be accepted as an important milestone towards outcome achievement, a project should be considered complete only after the reason for its approval has been fulfilled. A model, based on such an approach has been developed. Practical implications of this model mean that although senior managers do not normally influence project results directly, they have an indirect effect on the eventual levels of success by clearly defining, analysing and validating the relationship between project outcomes and outputs. The added value of this includes the development of an outcome based project theory and the definition of the project owner's new role.

**Analysis of Work Style in Operation & Maintenance of Information Systems: Proposal of New Problem-analysis Method Based on Inter-project Learning Aided by Ethnography**
Sadayo Hirata[1], Hiroshi Osada[1]
[1]*Tokyo Institute of Technology, Japan*

This paper focuses on the work style in operation & maintenance (O&M) of information systems and discusses potential problems hard for involved parties themselves to find out. First, this study used ethnography to extract problems and critical factors common to O&M projects. Secondly, the author analyzed the work styles by comparing critical factors of contrasting projects. Then, the results of the analyses were shared with both projects. The sharing resulted in raising awareness that behaviors and values taken for granted by the involved parties could be where the problem itself or room for creative thinking lied. It was confirmed that practicing the analysis method used in this study could be effective for cross-organizational learning between O&M projects.

**The Behaviour of Dispute Resolution Methods in Malaysian Construction Industry**
Heap-Yih Chong[1], Rosli Mohamad Zin[2]
[1]*Universiti Tunku Abdul Rahman, Malaysia*
[2]*Universiti Teknologi Malaysia, Malaysia*

Every project is bound to have disagreement. Alternative dispute resolution (ADR) techniques do not require full legal process and become mainstream option to traditional dispute resolutions. Yet, the actual practice of ADR is very low in the construction industry. Therefore, a comprehensive study is necessary to understand the behaviour of these dispute resolution methods. The research described in this paper discusses the philosophies and the selection factors of the dispute resolution methods. The factors are based on the attributes of the methods. Preliminary interview and questionnaire survey were conducted. The results from the data collected indicated that the contractors and developers are keen on ADR methods, however arbitration and litigation are somehow accepted and agreed by the respondents. It is concluded that selection on ADR or non-ADR is not a major issue, rather the increased efficiency and appreciation of the methods is more demanding towards the desired benefits at the end of the proceedings.

**Criteria for Screening New Products in the Electronic Component Distribution Industry**
Chi-Lung Chui[1]
[1]*City University of Hong Kong, Hong Kong*

Screening new industrial product ideas at the early stages of a new product development process is a critical activity. Although making a good new product choice is vital, managers have not applied systematic screening models because these models have not been customized to reflect the particular character of their company and industry. A customized systematic procedure is proposed to manage the task of selecting potential new products for an electronic component distributor at the early stages of a new product development (NPD) process. Screening criteria have been reviewed and optimized by project leaders and managers closest to the new product selection decision. The screening model has been used in a company to predict the success or failure of projects, and these predictions have been compared to the actual results from real projects. Thus, the study provides insights into the capability of the screening model and suggests further improvements to the screening process.

**Research on Influencing Factors of Selecting Construction Agent Based on Project Governance**
Ling Yan[1], Ran Xing[1]
[1]*Tianjin University of Technology, China*

Agent construction system to non-profit government investment project has just been launched in China, and many issues are to be settled urgently, one of which is the selection of construction agent. Some problems of selecting construction agent are found by statistical analyses, such as the lack of the selection procedure regulation, evaluation information disclosure, and so on. Solving the above problems by introducing project governance, this paper analyzes the competence of government supervision and project characteristics from internal governance, and analyzes the competence of construction agent and the maturity of agent construction market from external governance. Then the strategies of the selecting construction agent are given. Furthermore, considering the defect of agent market and the reduction in searching costs, construction agent list based on reputation mechanism of external governance should be established, which is a valid way to make up for the defect resulting from immature agent market.

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| **Session** | Intelligent Systems 1 |
| **Date** | 12/9/2009 |
| **Time** | 11:00 - 12:30 |
| **Room** | Montparnasse V |
| **Chairs** | Anan Suebsomran, Marc Wouters |

**Design and Implementation of Machine Tool Static Error Feedback Model**

Sanjeev Kumar[1], Parag Vichare[1], Aydin Nassehi[1], Vimal Dhokia[1], Stephen Newman[1]
[1]*University of Bath, United Kingdom*

CNC manufacturing has continuously strived to meet the increasing customer demand of quality control parts with minimum lead time. This essentially means developing CNC machine tool solutions which will result in less variation in the dimensions of manufactured products. It has been established in the recent past that static errors on a machine tool area major contributors in the overall errors for manufactured parts. The authors have proposed a feedback model to compensate the machine tool static error and provide compensated part feature positions. This model has been developed to map the static errors (as an effect of the movement in the kinematic joints of the machine tool) with the deviations in the locations of the part features. It has been then tested in a real time manufacturing environment using an industrially inspired test piece. The significant improvement in measurement results (for drilling positions) of manufactured parts shows the efficacy of the model.

**Using an Artificial Neural Network to Forecast the Market Share of Thai Rice**

Arthit Apichottanakul[1], K. Piewthongngam[1], S. Pathumnakul[1]
[1]*Khon Kaen University, Thailand*

In this paper, the artificial neural networks (ANN) is used to estimate the market share of Thai rice in the global market. Two models are formulated under two assumptions. First, the market share depending on exporting prices of rice of Thailand, Vietnam, India, USA, Pakistan, China. Second, we divide rice into two different markets. And only the export price of rice from Thailand, Vietnam, USA, and China that compete in the same market are considered. The export prices are used as input parameters, while the market share of Thai's rice in the global market is the only output parameter of the models. Annual data from 1980 to 2005 are gathered from United States Department of Agriculture (USDA) and Food and Agriculture Organization of the United Nations (FAO). The study showed that the second model provide more promising results with the minimum mean absolute percent error (MAPE) of 4.69% and the average MAPE of 10.92%.

**Stability Analysis of a Continuous-time T-S Fuzzy System**

Hung-Yuan Chung[1], Sheng-Chung Chan[1]
[1]*National Central University, Taiwan*

This study proposes absolute stability conditions and an approximate range of robust stability for a continuous-time T-S fuzzy system. In this paper, the mixed transfer functions to synthesize a T-S fuzzy model in any mixed weighting cases for the stability are introduced. A well-known Extreme Value Theorem and Kharitonov's Theorem are developed to analyze the stability robustness and to judge the stability conditions. Finally, two numerical examples are given to show the efficiency and the convenience of the method.

**Electromagnetic Actuated CVT System for Vehicle**

Md. Ataur Rahman[1], A.K.M. Mohiuddin[1], Ahmed Faris Ismail[1]
[1]*International islamic University Malaysia, Malaysia*

Electromagnetic Actuated Continuously Variable Transmission (CVT) system offers an opportunity to meet the challenge due to its improving automotive drivability and better fuel economy and dramatically reducing greenhouse gas emissions. The pushing and pulling the sheaves of the pulleys are conducted in this study in order to maintain the desired transmission ratio or gear ratio of the passenger car in all types of the road by developing electromagnetic solenoids (electromagnetic actuators). The operation of the solenoid is performed by controlling the eddy current with the aids of the lead acid battery, magnetic pick-up sensor and potentiometer. The response of the electromagnetic actuator is so fast that it can move both the sheaves of pulley at desired distance within fraction of seconds (0.01 s) in order to maintain the desired torque to the driving wheels in any road condition. The ability of the actuator is examined by applying additional load, voltage and number of turns of the solenoid. Experimentally, it was found that the EMA-CVT system was able to improve the 60% transmission losses of the car.

**The Restrictions in Economic Design Model for an X-bar Control Chart Under Non-normally Distributed Data with Weibull Shock Model**

Feng-Chia Li[1], Tzn-Chin Chao[2], Li-Lon Yeh[3], YenFu Chen[1]
[1]*Jen Teh Junior College of Management, Taiwan*
[2]*Hwa Hsia College, Taiwan*
[3]*Tsing Hwa University, Taiwan*

This paper proposed an approach which simultaneously considers the properties of cost and quality based on the Burr distribution to determine three parameters (including sample size, sampling interval between successive samples, and the control limits) when an x bar chart monitors a manufacturing process with Weibull failure characteristic and non-normal data. Most control chart economic statistical designs assumed the failure mechanism, which belongs to the Poisson distribution. However, this is not usually pragmatic. Because the assumption of Poisson failure mechanism was not always appropriate in practice, especially for processes in which machine wear occurs over time. Processes with increasing hazard functions are common in the mechanical and electrical industries. These subgroup measurements were assumed to be normally distributed when designing control charts. However, that assumption may not be tenable in this research. Hence, this study employs a numerical example to indicate the solution procedure. Furthermore, the objective function is to minimize expected cost per hour, and type I error ( ) and power ( ) are restricted by maximum value of type I error ( ) and minimum value of power ( ) respectively in non-normally distributed data.

**Comparison of the Primitive Classifiers with Extreme Learning Machine in Credit Scoring**

Feng-Chia Li[1], Peng-Kai Wang[2], Gwo-En Wang[3]
[1]*Jen Teh Junior College of Management, Taiwan*
[2]*Hwa Hsia Institute of Technology, Taiwan*
[3]*University, Taiwan*

With the rapid growth in the credit industry, credit scoring classifiers are being widely used for credit admission evaluation. Effective classifiers have been regarded as a critical topic, with the related departments striving to collect huge amounts of data to avoid making the wrong decision. Finding effective classifier is important because it will help people make an objective decision instead of them having to rely merely on intuitive experience. This study proposes two well-known classifiers, namely, K-Nearest Neighbor (KNN), Support Vector Machine (SVM), which will be used to find the highest accuracy rate classifier without features selection. Two credit data sets from University of California, Irvine (UCI) are chosen to evaluate the accuracy of various classifiers. The results are compared and the nonparametric Wilcoxon signed rank test will be performed to show if there is any significant difference between these classifiers. Performance of the KNN classifier is better in only one data set but not significant, whereas SVM classifier is significant superior to Extreme Learning Machine (ELM) classifier in the German data set. The result of this study suggests that the primitive classifiers did not achieve satisfactory classification results. Combining with effective feature selection approaches in finding optimal subsets is a promising method in the field of credit scoring.

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| **Session** | Intelligent Systems 2 |
| **Date** | 12/9/2009 |
| **Time** | 13:30 - 15:00 |
| **Room** | Montparnasse V |
| **Chairs** | Hung-Yuan Chung, Stephen Newman |

**Logic of Probability Entailment with Threshold-Surety**
Yong li[1], WeiYi Liu[2]
[1]*Kunming University of Science and Technology, China*
[2]*Yunnan University, China*

We offer a logic of probability entailment with Threshold-Surety approach to a probabilistic logic, which treats a finite set of premises in a knowledge base as assertions that are true with probability at least some primary threshold and consider as a finite set of alternative conclusions those assertions probabilistically entailed to have probability at least some suitable threshold ζ. We use the concept of fuzzy c-partition and the maximum fuzzy entropy principle to select the threshold values for knowledge base and have conducted an illustrative experiment.

**Automatic Guided Vehicle Control by Vision System**
Suthep Butdee[1], Anan Suebsomran[1]
[1]*King Mongkut's University of Technology North Bangkok, Thailand*

AGV's control has been developed in several types. This research aims to develop the AGV's control using image processing in order to assist AGV from losing the way when the guide line is missing. The AGV, used for experiment, has three wheels. There are one wheel at the front and another two at the back. The front wheel is drived by DC motor whereas the two wheels are used for steering control. An encoder is used to check AGV orientation angle. PLC is applied for AGV's control application. Wireless color CCD camera is used to be a sensor for detection line's color that is placed on AGV and used to navigate the detected path of traveling. Red line is used for AGV's path. Image processing is used for detecting the guide line and the background. Laplacian operator method is applied for edge detion algorithm including filter and thresholding technique. Computer program will created the virtual line by using trigonometry method and sent current position data to control AGV's motion.

**Unsupervised Clustering for Electrofused Magnesium Oxide Sorting**
Daniel Pun[1], Shawkat Ali[1]
[1]*CQUniversity Australia, Australia*

This research is concentrated on using unsupervised learning technique and digital image processing to cluster mineral materials, Electrofused Magnesia Oxide specifically, for industry automation. We proposed a technique to construct an image database by generating data from images using a digital image process. This is based on a simple histogram mode and intensity deviation. A group of two popular clustering algorithms has been tested to develop an automatic system for industry. We have concluded that the best suited algorithm for this application in the mineral industry from this group of two algorithms is the k-means algorithm.

**Fuzzy Clustering Decision Tree for Classifying Working Wafers of Ion Implanter**
Shih-Cheng Horng[1], Yu-Liang Hsiao[1]
[1]*Chaoyang University of Technology, Taiwan*

In this paper, we propose a fuzzy clustering decision tree (FCDT) for the classification problem with large number of classes and continuous attributes. A hierarchical clustering concept is introduced to achieve a finer fuzzy partition. The proposed clustering algorithm split the data set into terminal clusters using splitting attributes based on a separation matrix and fuzzy rules. The terminal clusters consisting of the data of more than one class will be further classified using the C4.5. We have successfully applied the FCDT to the classification problem of the working wafers in an ion implanter, and compared the classification results and the computation time with the existing software See5 and CART.

**Applying Neural Networks to Detect the Failures of Turbines in Thermal Power Facilities**
Kai-Ying Chen[1], Long-Sheng Chen[2], Mu-Chen Chen[3], Chia-Lung Lee[1]
[1]*National Taipei University of Technology, Taiwan*
[2]*Chaoyang University of Technology, Taiwan*
[3]*National Chiao Tung University, Taiwan*

Due to the growing demand on electricity, how to improve the efficiency of equipment has become one of the critical issues in a thermal power plant. Related works reported that efficiency and availability depend heavily on high reliability and maintainability. Recently, the concept of e-maintenance has been introduced to reduce the cost of maintenance. In e-maintenance systems, the intelligent fault detection system plays a crucial role for identifying failures. Machine learning techniques are at the core of such intelligent systems and can greatly influence their performance. Applying these techniques to fault detection makes it possible to shorten shutdown maintenance and thus increase the capacity utilization rates of equipment. Therefore, this work applies Back-propagation Neural Networks (BPN) to analyze the failures of turbines in thermal power facilities. Finally, a real case from a thermal power plant is provided to evaluate the effectiveness.

**Q(λ) Learning Technique for Ph Control**
Syafiie Syafiie[1], Tadeo Fernando[2], Ernesto Martinez[3]
[1]*University Putra Malaysia, Malaysia*
[2]*University of Valladolid, Spain*
[3]*Consejo Nacional de Investigaciones Científicas y Técnicas, Argentina*

A simple approach of learning control for controlling a pH neutralization process has been developed in this paper. One step a head Q-learning, namely Q(λ)-learning, lookup table is developed and applied to pH process. This method is applied for weak base – strong acid neutralization process. The objective is to maintain the pH to stay on the goal state. The application at a laboratory pilot plant shows that the proposed Q(λ)-learning regulates the process well, even in the presence of reference changes.

**Agent-based Cloud Commerce**
(Ben) Kwang Mong Sim[1]
[1]*Gwangju Institute of Science & Technology, South Korea*

In a business model for Cloud computing, users pay providers for consumption of their computing capabilities. This work develops an agent-based testbed for bolstering the discovery of Cloud resources and SLA negotiation. In the testbed, provider and consumer agents act as intermediaries between providers and consumers. Through a 4-stage resource discovery process (selection, evaluation, filtering, and recommendation), a set of broker agents match consumers' requests to advertisements from providers. Following the matching of requests to resources, consumer and provider agents negotiate for mutually acceptable resource time slots. Empirical results show that broker agents are successful in matching requests to resources, and consumer and provider agents are successful in negotiating for mutually acceptable time slots.

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| **Session** | Decision Analysis and Methods 1 |
| **Date** | 12/9/2009 |
| **Time** | 15:30 - 17:00 |
| **Room** | Montparnasse V |
| **Chairs** | Amnon Gonen, Parimal Acharjee |

**Optimal Strategy Model of Electricity Purchasing and Sales for Retail Electricity Providers Using Conditional Value at Risk Theory**

Yu Cheng[1], Qingxia Wang[1], Yefei Sun[2]
[1]*North China Electric Power University, China*
[2]*Changping Power Supply Company of Beijing Electric Power Company, China*

In open electricity retail market, retail electricity providers(REPs) use different combined electricity purchasing strategies with different transaction modes and varieties, and sign different electricity retail contracts with customers. REPs maximize their profits and meet the requirements of customers with these contracts. Because of fluctuations of spot price and uncertainties of electricity demands, REPs have different profits and risks levels with different electricity purchasing and sales contracts. This paper established electricity purchasing and sales mean-CVaR model for REPs using conditional CVaR theory. The mean-CVaR model also considered electricity price elasticity of demand. The analysis results indicates that mean-CVaR model can be used to support electricity purchasing and sales strategy making of REPs with a certain degree of risk tolerance level.

**Building A Consumer Experience Framework in Housing Refurbishment Service Industry**

Ching-Yu Lien[1], Chih-Wen Huang[2]
[1]*Ming Hsin University of Science and Technology, Taiwan*
[2]*Tamkang University, Taiwan*

The objective of this study is to apply concepts of consumer experience, using qualitative analysis, to construct a new theoretical framework for the housing refurbishment service industry and to adopt confirmatory factor analysis (CFA) to verify a consumer experience scale in relation to housing refurbishment. The aim is to explore the factors and relationships among consumer experiences of housing refurbishment services using qualitative and quantitative analyses. Drawing data from semi-structured interviews with 87 consumers, the results demonstrated that the value experience was a new experience created by the housing refurbishment service. This study also offered several relational propositions regarding experience processes and developed a consumer experience scale specific to the housing refurbishment industry. In addition, based on a sample of 601 consumers for quantitative analysis, the results clearly supported the proposed scale of consumer experience in the housing refurbishment industry.

**A Decision Analysis for Introducing Corporate Social Responsibility on Science and Technology Industry**

Tyrone T. Lin[1], Pei-Hsin Lai[1]
[1]*National Dong Hwa University, Taiwan*

In consideration of the development of the technology industry and the issue of global warming caused by the environmental pollution and deterioration, "Corporate Social Responsibility (CSR)" has become the subject of attention. Therefore, this paper will explore how enterprises evaluate the relationship between the additional cost for protecting the environment and the intangible firm value generated from investing in CSR in order to obtain the maximum firm value under the consideration of environmental economics. This paper introduces the utility function to analyze the intangible benefits generated from investing in CSR and uses the real options approach to construct a mathematical model to find out the optimal time point for investing in CSR. The result can provide the reference of decision-making for managers in consideration of the profits under the financial economics and the corporate social responsibility under the environmental economics.

**Development of a Hybrid Model to Improve the Efficiency of Business Process Reengineering**

Wen-Hsien Tsai[1], Ching Chien Yang[2], Hsiao- Chiao Kuo[1]
[1]*National Central University, Taiwan*
[2]*ChungChou Institute of Technology, Taiwan*

Business process is a fundamental building block of organizational success. Business process reengineering (BPR) has been considered an important way to improve organizational performance. This paper develops a hybrid model for operationalizing a BPR project. This model for selecting and assessing the best practice items of BPR is proposed to address inter-relationships among best practice items using Decision Making Trial and Evaluation Laboratory (DEMATEL) and composite importance (CI) method. We compare the importance of the best practice items from a managerial perspective with the importance of the best practice from the perspective of employees to evaluate the optimal best practice items for improving BPR efficiency. A case is used to present the processes of this hybrid model.

**A Systems Approach for Hospital Inpatient Bed Capacity Planning**

Balagopal Gopakumar[1], Shengyong Wang[1], Mohammad Khasawneh[1], Krishnaswami Srihari[1], Tejas Gandhi[2], Ninfa Saunders[2]
[1]*State University of New York, Binghamton, United States*
[2]*Virtua Health, United States*

Evaluating best strategies across the organization has been a major challenge for healthcare decision makers. The complex nature of patient flow and the unpredictability involved makes discrete event simulation an ideal tool for evaluating strategic decisions in hospital inpatient capacity planning. In this paper, simulation was used to evaluate scenarios pertaining to hospital inpatient capacities. The requirement of additional capacities over the planning horizon was modeled and evaluated. Similarly, the impacts of the opening of a new competing hospital facility were studied.

**The Bi-objective Stochastic Chance-Constrained Optimization Model of Multi-Project & Multi-Item Investment Combination Based on the View of Real Options**

Bin Xu[1], Jing Yu[2], Yan Meng[1]
[1]*Central University of Finance and Economic, China*
[2]*China Science Academy, China*

This paper presents a new stochastic chance-constrained 0-1 integer programming model for investigating the investment combination problem in multi-project multi-item investment combination. The proposed model includes two objectives with stochastic constraints to construct a 0-1 integer programming model. On the one hand, the risk value will be measured by negative entropy; on the other hand, the pursued value objective will be composed of two parts, which including classical NPV and the corresponding real option for any item of any project. Then how to use DE to solve the model with a small modification of constraint-handling rule will be illustrated. A simulation experiment is employed to illustrate the application of the proposed model to get the Pareto-optimal solutions by applying the modified algorithm DE.

**The Option-Game Analyses on Pricing Decision of the Target Enterprise of M&A under Fuzzy Information Surroundings**

Jing Yu[1], Bin Xu[2], Yuanhua Wang[3]
[1]*China Science Academy, China*
[2]*Central University of Finance and Economic, China*
[3]*Beijing Institute of Clothing Technology, China*

Though the price of M&A has already been studied based on classical NPV model, which is not adaptable for real uncertain situation. This paper presents a new approach of measuring the target enterprise value of M&A, consisting of two parts, one is measured by NPV model and another is measured by real options model, which can be integrated to calculate the target enterprise by introducing synergy effect coefficient into the developed model. The price of target enterprise can be attained by famous Rubenstein bargaining theorem which will be improved to be adapted to the fuzzy information surroundings. In last, a numeric simulation will be drawn to illustrate the application of price decision formulation, and the sensitivity of price will also be shown with the variability of parameters among the developed price-decision model.

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| **Session** | Poster Session 1 |
| **Date** | 12/9/2009 |
| **Time** | 15:00 - 15:30 |
| **Room** | Longchamps I & II |

**Effect on Supply Network Relationship: A Long-Term Analysis of Firm Behavior**
Chao-Chen Hsieh[1], Jun-Zhi Chiu[2]
[1]*Kao Fong College, Taiwan*
[2]*I-Shou University, Taiwan*

The purposes of this paper are: first, introduce the rationales for relationship of supply network; second, explore whether supply network relationship existing long-term effect; third, examine the mechanisms through the crested and evolved supply network. The analytical results demonstrated automotive assembly companies and components existed long-term effect. Subsequently, the study also examined the mechanisms via the use of cointegrantion analyses to study the competitive behavior of firms.

**Application of Decision-making Ontology for Automotive Body Assembly Design**
Li Zhang[1], Liang Gao[1], X.Y Shao[1]
[1]*Huazhong University of Science and Technology, China*

Automotive body assembly design in conceptual design stage is a complex group decision-making process which involves knowledge communications and projects selections. Ontology is a useful tool to abstract vague and linguistic knowledge. In this paper, a Project-handling Module based Decision-making Ontology Model (PMDOM) is proposed to accelerate communication of decision-making and help for the selection of projects. Based on PMDOM, an automotive body assembly domain ontology model is set up and the Decision-making Support System (DSS) has been implemented by using JAVA. It shows that the DSS with PMDOM is better than others without PMDOM.

**A Method for Analytical Target Cascading Using the Exterior Penalty Function**
ZhiWei Guo[1], Guangchen Bai[1]
[1]*Beijing University of Aeronautics and Astronautics, China*

Analytical target cascading is a hierarchical multilevel design methodology. In this method, top-level design targets are cascaded to lower-level design problem in a consistent manner. In this paper, an exterior penalty function formulation for analytical target cascading is developed. The proposed method has a simple formulation and the results shows that the solution from the new method converges to the solution from the all-in-one problem.

**Developing an Evaluation Performance Processes for Collaborative Technology of Software Contractor**
Cheng-Ru Wu[1], Che-Wei Chang[1], Chia-Chun Liao[1], Chiu-Chin Chen[1]
[1]*Yuanpei University, Taiwan*

The next few years, the world towards a high degree of competitiveness of industrial enterprises in the development of business models, competition and cooperation, the flexibility of management changes in a timely manner, on the business and the contractor's use collaborative software technology to create competitive advantage and setup inter - communication platform develop systems to control the exchange of information, can reduce the time and error. Most important is the face of how to choose a partner, use collaborative management, making business and cooperation partners, in order to assess the decision standardization. This study used the grey situation decision (GSD) decision support tools to select the computer integrated manufacturing (CIM) software and provide a useful reference work with partners in the enterprise is follow the relationship and technical cooperation.

**Deviant Ratings and the Effectiveness of Performance Appraisal**
Hairu Yang[1], Zhengyi Jiang[2], Haiyan zhai[2], Fue Zeng[3]
[1]*City University of Hong Kong, Hong Kong*
[2]*Shanghai Finance University, China*
[3]*Wuhan University, China*

In order to maximize performance appraisal effectiveness, extant literatures explore methods to reduce rater errors, improve rating accuracy and qualitative aspects. Even if these methods can substantially improve performance appraisal effectiveness, it is still unable to completely eliminate the existing of deviant ratings because the raters are subjective factors for the evaluation. This study introduces a statistical method that can effectively identify and eliminate deviant ratings, thus greatly improving the effectiveness of performance appraisal. Limitations of the method and future research directions are also discussed.

**Study on the Modeling of Aviation Materials Storage Management Decision-Making**
Danyang Shen[1], Yunchun Cao[1]
[1]*Civil Aviation University of China, China*

This paper aims to give out the order decision-making model of aviation materials storage management and to analyze the more economical way in view of supply chain management. The aviation materials are firstly divided into rotable parts and expendable parts, and then cycle inventory method, moving average method and the EOQ model are used to determine the inventory levels of AMs according to the different categories. Finally this paper discusses the key variable, which influences the storage management decision-making.

**Price Prediction of Target of Mergers and Acquisitions Based on Genetic-algorithm BP Neural Network**
Hongjiu Liu[1], Weimin Ma[1]
[1]*Tongji University, China*

In order to predict the price of candidates in acquisition and evaluate its feasibility, this paper puts forward a model of price prediction of candidates based on genetic-algorithm and BP neural network. The model is trained by the data of market deals which were made in the past. The result of simulation and test indicates that average error of prediction is percent 11.03. It can be as the reference of evaluating the feasibility of mergers & acquisitions. More index and training samples should be increased to improve the model.

**Applying Cluster Analysis to Segment Construction Steel Market**
Jamal Shahrabi[1], Shima Moein Najafabadi[1], Mahdi Sahebnasagh[2]
[1]*Amirkabir University of Technology, Iran*
[2]*Information and Communication Technology Development Center, Iran*

Designing a product or preparing a marketing plan is exceedingly difficult when individuals in the target market have differing needs and behaviors. Marketers try to solve this problem by using market segmentation. The customers for construction steel products take into assessment many different characteristics, and compare the various offers on the basis of these specifications. So for a construction steel manufacturer it is important to know which group of customers pays more attention to which characteristics.
In this research, with the identification of the major specifications of construction steel products, cluster analysis, is used as a market segmentation tool for grouping customers. Information was collected via questionnaires. The observations were categorized in the variables determined by the segmentation mechanism based on their similarities with each other, with the help of cluster analysis techniques. Since the use of multivariate methods is considered an exploratory method, validity of the results is proved.

**Research on the Relationship Between Foreign Trade and the GDP Growth of Southwest Minority Region of China--Empirical Analysis Based on the Panel Causality**

Yuhong li[1], Xiaoyin wang[2]
[1]*Jinggangshan University, China*
[2]*Huazhong Agricultural University, China*

In open economy, development of foreign trade greatly impacts GDP growth. Adapting modern metering methods like roots of unity, panel co-integration analysis and error correction model for researching the causalities between foreign trade including total export and import, total export and total import and GDP growth of southwest minority of China. The result suggests that there exist long time or short time causality between GDP and total export and import as well as between GDP and export, foreign trade is the long time and short time reason of GDP growth, but no evident can prove that there exists long time stable causality between foreign trade and GDP. This paper ends up with recommendations to develop the economy of southwest minority region of China.

**Study on the Decision Support System for Optimal Operation of Cascaded Hydropower Plants in Local Power Network**

Wei Zhong[1], Yang Song[2], Zhen-dong Tan[3]
[1]*Tianjin University of Technology, China*
[2]*Tianjin University, China*
[3]*Academy of Military Transportation, China*

In order to meet the need of local power optimally allocating its cascade hydropower plants, a decision support system for optimal operation of local cascaded hydropower plants is studied and designed out in this paper. The functions of the system include data management, hydrological forecast, long-time optimal operation alternative, short-term optimal operation alternative and daily operation scheming. The system can provide decision support for optimal operation of small cascade hydropower plants in local power nerwork.The system is applied in one local power network, and the results show that it is efficient.

**A Multistage Algorithm for the Job Shop Scheduling Problem**

Jianshuang Cui[1], Liang Cheng[2], Tieke Li[1]
[1]*University of Science&Technology Beijing, China*
[2]*Lehigh University, United States*

This paper present a multistage algorithm for the job shop scheduling problem (JSP). A theorem is proved that the calculability of a solution is the sufficient and necessary condition for its feasibility. Therefore, an infeasible solution will be discarded immediately and the improved critical path algorithm is applied to perform the local search for a feasible solution. The computational results with standard benchmark problems demonstrate that the algorithm could obtain high-quality solutions within reasonable time.

**Decision Making Model On Strategic Technology Investment Using Game Theory**

Wei-Cheng Liao[1], Chi-Yen Yin[1], Johannes K. Chiang[1]
[1]*National Chengchi University, Taiwan*

The paper is describing the real options is a better way of thinking about valuation and strategic decision making on technology investment by replacing those traditional methods. The method is to transfer the strategic technology investment toward onto one kind of real options which combined many projects to the part of investment plan as one of target-linked for investors. This research integrated game theory and real options method which also executed the investment benefit from real options to payoff which pondered over the rivals' possible investment strategy by the equilibrium concept, and acquired the optimal investment strategy for enterprises. Finally it is to simulate decision making model on the MIS investment case for two car companies to demonstrate how to make the strategic technology investment strategy and its efficiency.

**Risk Measurement of Decision-Making in Acquisitions Based on Genetic Algorithm and BP Neural Network**

Yanrong Hu[1], Hongjiu Liu[2], Weimin Ma[2]
[1]*Changshu Institute of Technology, China*
[2]*Tongji University, China*

Appropriate methods are helpful to measure risk. The risk is objective in acquisitions. It resources from subjective risk, morality risk, information asymmetry risk, law risk, system risk, policy risk and market risk during the process of mergers and acquisitions decision-making. In the different stages of decision-making, the emphases of risks are different Index of measuring risks can be established by industrial experts. The case demonstrates that genetic algorithm and BP neural network are good tools to measure the risks.

**An Algorithm for Type-I Assembly Line Balancing Problem with Optimal Workload Balance**

Hsiu-Hsuch Kao[1], Din-Horng Yeh[2]
[1]*Yuanpei University, Taiwan*
[2]*National Chung Cheng University, Taiwan*

We consider the Type-I assembly line balancing problem (ALBP-I), in which the objective is to minimize the number of workstations needed for a given cycle time. In practice, it is also important that the workload among workstations should be well balanced. The purpose of this paper is to develop an optimal algorithm, based on the shortest route algorithm proposed by Gutjahr and Nemhauser in [Management Science 11 (2) (1964) 308-315], that not only minimizes the number of workstations needed, but also optimizes the workload balance among workstations.

**Performance Evaluation of Constructed Facilities through Linguistic Judgment**

Nang-Fei Pan[1], R.J. Dzeng[2], M. D. Yang[3]
[1]*National Cheng Kung University, Taiwan*
[2]*National Chiao-Tung University, Taiwan*
[3]*National Chung Hsing University, Taiwan*

It is often difficult to estimate exact probabilities of occurrence of fault events for the use in the conventional fault tree analysis (FTA) when failure data are insufficient or fault events are vague such as human error. A hybrid approach utilizing fuzzy sets and possibility theory is presented to overcome this problem. In the approach, failure possibilities of imprecise events are characterized by fuzzy sets to translate expert subjective judgments while fuzzy fault rates are derived from fuzzy possibility scores based on a modified possibility transformation function. An example of beam failure is presented to demonstrate the capability of the approach that can assist safety engineers to effectively assess fault possibilities and better analyze building performance.

**Reliability Prediction of an Ethernet Bus Interface Controller in a Nuclear Power Plant Simulator**

Lixuan Lu[1], Le Dong[1]
[1]*University of Ontario Institute of Technology, Canada*

Obsolescence presents great challenge to Nuclear Power Plants (NPP) and plant simulators around the world. Old designs will have to be either modified, or replaced by new designs, in order to simplify maintenance, increase availability and meet ever-increasing operational and training requirements. Control system upgrade and Distributed Control System (DCS) design for both old plants and new builds have become the center of interest nowadays. This paper describes a new Ethernet Bus Interface Controller (eBIC) used in the Input/Output (I/O) system of a Nuclear Power Plant (NPP) simulator in Canada. The reliability of the eBIC is evaluated, and compared with the reliability of the existing Bus Interface Controller (BIC). It is shown that the predicted failure rate of the new eBIC is five times lower than that of the existing system, making the new system more reliable and robust. The results raise the level of confidence in this design. The reasons for this improvement are also discussed.

**A Maintenance Model For The Supply-Buffer-Demand Production System**

Tian Qin[1], Qingpei Hu[2], Huaiqing Wang[2]
[1]*National University of Singapore, Singapore*
[2]*City University of Hong Kong, Hong Kong*

Maintenance means repairing an engineering system when it fails to perform normally, including operations to keep the system in good operating status and to prevent the system from deteriorating. As deterioration is inevitable in engineering systems, maintenance measures are always necessary and crucial in ensuring the performances of the systems in their lifecycle. Accordingly, there are many research works focusing on this topic, with many papers published. In this paper, we study the problem of designing an optimal maintenance scheme on the Supply-Buffer-Demand (SBD) production system, with two production machines connected by a buffer stock. Specifically, our model is developed through extending previous work by Chelbi and Rezg (2006), relaxing its assumption on preventive maintenance from perfect maintenance to imperfect. Also, the additional availability and reliability requirements for the system are considered. Analytical analysis and numerical algorithm for this optimization model are presented, with an example shown for the purpose of illustration.

**Develop Software Operational Profile with Uniform Design**

Jianping Fu[1], Minyan Lu[1]
[1]*Beihang University, China*

In order to control the operation number effectively a new method based on uniform design is proposed to develop the software operational profile. First, calculate the operation rating and then develop a rough operational profile. Partition some operations corresponding to multi-attribute regions by comparing occurrence probabilities and uniform design method. After some adjustment to operations and occurrence probabilities, the operational profile is accomplished finally. An application indicates the method can generate an operational profile meeting demands and the analysis shows its superiority.

**Evaluation of Cockpit Design by Using Quantitative and Qualitative Tools**

Mehmet Burak Senol[1], Metin Dagdeviren[1], Mustafa Kurt[1], Canan Çilingir[2]
[1]*Gazi University, Turkey*
[2]*Middle East Technical University, Turkey*

Cockpit displays and the controls are sophisticated human machine interface applications. Display systems, present at cockpits are complex environments causing excessive mental workload and the consequences of errors can be catastrophic. In order to prevent any human error a user-friendly display panel must be designed. In this study quantitative and qualitative approaches are used to evaluate the positions of analogue indicators at front display panel from human factors point of view. Multi Criteria Decision Making (MCDM) algorithms are employed as quantitative tools. In order to test whether or not the Decision Maker's (DM) preferences are consistent with a quasi-concave, a quasi-convex and a linear utility function, a combined algorithm is applied. Due to the form of utility function; an algorithm finding the most preferred alternative of DM is used. The aim of this approach is to find an order to locate each indicator to suitable classes. Card Sorting methodology is used as the qualitative research tool for the same problem. Results of these two approaches are compared.

**A Study of Information and Aiding Interface Design in B2C Web Sites**

H.M. Kuo[1], Cheng-Wu Chen[2], C.H. Hsu[3]
[1]*Shu Te University, Taiwan*
[2]*National Kaohsiung First University of Science and Technology, Taiwan*
[3]*Hsiuping Institute of Technology, Taiwan*

In this study we evaluate the information and interface design of the shopping website, in order to better understand how to provide service suited to the customer. The internet consumer behavior model forms the structural basis of the examination. An evaluation form was designed based on this model and used to examine 351 domestic and foreign shopping websites, for information and interface design. Comparisons were made between websites related to the aspects of product category, behavioral step, and domestic/foreign websites. The results can serve as useful reference for website owners and designers to provide consumers with more convenient and barrier-free shopping environments.

**Demographic Change in Focus of Production Enterprises**

Uwe Dombrowski[1], Sven Schulze[1], Thimo Zahn[1]
[1]*Technische Universität Braunschweig, Germany*

Producing enterprises especially in Europe and Japan have to deal with the effects of the demographic change. Not only an unbalanced age structure in many enterprises with a high number of older workers but although the rising pension entrance age in many countries lead to an older workforce. Older co-workers are however often reduced in their physical efficiency, so that clock-bound work or lifting heavy loads is not possible anymore and adequate jobs for older employees must be designed and offered. But in many enterprises the impact of the problem is not clear. A prognosis about the future age structure in the company and at the same time of the number and type of restrictions of the workforce is needed. The following paper describes how the size of the problem for an enterprise can be appraised and how measures can be derived.

**A Turning Function Based Approach for Foot Outline Classification**

Asanka Rodrigo[1], Ravindra Goonetilleke[1], S. Goonetilleke[1]
[1]*Hong Kong University of Science and Technology, Hong Kong*

This study introduces a turning function based technique to classify foot outlines. Foot scans from ten males and ten females were obtained using a laser scanner. The similarities among the different foot shapes were assessed based on the Euclidean distance between turning functions. Thereafter, average linkage clustering was used to classify the differing foot outlines. Two distinct shape groups emerged for both medial and lateral sides. The presence or absence of a medial bulge results in two clusters on the medial side. Similarly, a narrow lateral side with more concavity and a wider lateral side in the midfoot region are the two clusters for the lateral side. More males (60%) showed a bulge on the medial side. The group that belongs to the narrower lateral side were predominantly females (70%). These differences in the structure of the clusters were reflected in the lack of a correlation between the medial and lateral side clusters.

**The Impact of Organizational Behavior on Psychological Contract Breach in China**

Yongyue Wang[1], Feng Wei[2]
[1]*Zhejiang Gong Shang University, China*
[2]*Shanghai University, China*

Psychological contract received wide interest among researchers from different countries and became an ideal framework in the study of the employment relationship. In this study, we focused on the impact of organizational behavior on psychological contract breach in china. We conducted an in-depth questionnaire survey to 512 MBAs and senior managements in Zhejiang enterprises. By applying structural equation modeling, we found: the influence of organizational communication behavior on psychological contract breach is not significant; organizational justice has some effect on the psychological contract breach between organizations and their employees; the level of organizational human resources practice has a significant impact on the psychological contract breach.

**Personality Traits, Selling Behaviors and Their Relationship with Sales Performance: Evidence from Direct Selling Industry**

Yiren Dong[1], Yonggui Wang[2], Huachao Gao[1]
[1]*Nanjing University, China*
[2]*University of International Business and Economics, China*

This paper aims at investigating the relationship among direct sellers' personality traits, sales behaviors and their performance. Based on data from questionnaire survey, a PLS-based structural equation model has been developed. The results demonstrate that both adaptive selling behavior and canned selling behavior have positive influence on selling performance. Furthermore, we find that conscientiousness has a direct influence on selling performance while adaptive selling behavior mediates the relationship between extraversion, conscientiousness,

agreeableness and selling performance. Other personality traits have no significant influence on selling performance. One managerial implication of this paper is that under current environment, the performance of Chinese direct sellers may rely on guanxi in some extent.

**Analysis and Evaluation of Human Factors in Aviation Maintenance based on Fuzzy and AHP Method**

Lei Wang[1], Ruishan Sun[1], Zhihui Yang[2]
[1]*Civil Aviation University of China, China*
[2]*Xianyang International Airport, China*

This paper aimed to develop a quantitative and objective method to analyze and evaluate human factors in aviation maintenance process. Firstly a detailed classification and causing analysis on human errors in aviation maintenance was carried out basing on SHEL and Reason Model; then an integrated evaluation solution was proposed out by using fuzzy and AHP method together. Then the solution was ap-plied into practice for an evaluation case. Finally it concluded that Noise & vibration, Professional ethics & responsibility, Safety information sharing and Com-pleteness of software & document took the four largest weights to the four first-level indices respectively. This comprehensive evaluation method was expected to be using in practice and provide effective support to prevent human errors and improve safety in maintenance organizations.

**New Approach to Ergonomic Design of an Industrial Workplaces**

Marek Bures[1]
[1]*University of West Bohemia, Czech Republic*

In the paper a new rising methodology, which integrates the actual classical approach on design and evaluation of workplaces in industrial companies with the new methods for workplace design with the help of ergonomic analysis and software tools is published. This methodology has three main areas that are algorithm, knowledge rule base and software support. The closer description and functionality is described in the paper. At the end of the paper there are also given a solutions for methodology verification in praxis.

**Web Content and its Influence on Operational Performance–Case of the Hotel Industry**

Jia-Jane Shuai[1]
[1]*Ming-Hsin University of Science & Technology, Taiwan*

Hotels are increasingly taking advantages of the Internet as a marketing tool able to provide direct contact with customers. This study evaluated the hotel's websites in Taiwan from a marketing perspective. Content analysis was used to analyze and compare the marketing practice on Internet. Using data envelopment analysis, this article analysis the impact of internet marketing on hotel performance. The result showed that internet marketing can improve the operating performance of tourist hotels. It is suggested that hoteliers should adopt a more strategic approach to the Internet, preparing the ground for direct contact with customers.

**Will Users Embrace Advertising in Online Communities?A Sociological Perspective**

Fue Zeng[1], Li Huang[2], Hua Zhang[2], Wenyu Dou[2], Hairu Yang[2]
[1]*Wuhan University, China*
[2]*City University of Hong Kong, Hong Kong*

Drawing on sociology and advertising literature, we investigate the impact of group bonding and group norms on community users' group intentions to embrace advertising in online social communities. By outlining how group intention influence community members' perceptions, this study delineates possible mechanisms by which community members may respond positively to community advertising. An empirical study was conducted with Chinese internet users to test the model. The marketing implication for advertising in online social community follows that community sites in pursuit of advertising revenue should strive to create cohesive bonds and efficient group norms among members.

**Factors Affecting the Adoption of E-Commerce by New Technology Based Firms in the UK: the Role of the Entrepreneurial Founding Team**

Panagiotis Ganotakis[1]
[1]*Aston University, United Kingdom*

This study contributes to the existing literature of IT/E-Commerce adoption both theoretically and empirically. Theoretically by combining the Resource Based Theory and the 'Technology, Environment, organization' framework, while at the same time considering the Entrepreneurship and Human Capital theories in order to provide a theoretical base for the inclusion and measurement of the capabilities of all members of an Entrepreneurial Founding Team and to investigate the effect that they have on EC adoption. Empirically by considering the actual adoption of EC by 412 high-tech firms in the UK at the end of 2005 removing therefore self-reporting bias, while also investigating those factors that differentiate between nonadopting firms and basic adopters and those that distinguish between basic and enhanced adopters.

**Using Real Options to Evaluate the Reasonable Renminbi Exchange Rate Interval**

Tyrone T. Lin[1], Li-Jyuan You[1]
[1]*National Dong Hwa University, Taiwan*

Under the circumstances whether the Renminbi (RMB) exchange rate should be appreciated or depreciated to reach the reasonable level, the current RMB exchange rate seems to be improperly valued. This paper uses the Pearson correlation analysis and regression analysis to select six macroeconomic indicators and then uses the positive and negative relative weight to do the empirical analysis to find out the reasonable RMB exchange rate ranges. Furthermore, the paper will introduce the real options approach to get the appropriate RMB exchange rate interval in consideration of the influences of the potential value of appreciation or depreciation and other unexpected events on the exchange rate. The results will provide another measure or thinking of evaluating the reasonable RMB exchange rate interval.

**A Study of Making Optimal Marketing and Warranty Decisions for Repairable Products**

Chih-Chiang Fang[1], Chin-Chia Hsu[2]
[1]*Shu-Te University, Taiwan*
[2]*National Taiwan University, Taiwan*

Warranty plays an important role in the market, not only safeguarding the rights and interests of consumers but also promoting the sales and reputation of manufacturers. Due to its impacts on the market, manufacturers should take their warranty policies into consideration in developing an integrated marketing strategy which can promote a product by simultaneously considering pricing, production, and related post-sale services. In this study, we made an integrated study and proposed a mathematical programming model to help manufacturers systematically decide pricing, production and warranty policies.

**Cost Analysis for Sewer Systems Constructed by Open Cut and Jacking Techniques**

Shuang-Fu Yeh[1], Min-Der Lin[1], Kang-Ting Tsai[1]
[1]*National Chung Hsing University, Taiwan*

This study developed cost functions, which were expressed as functions of pipe sizes and excavation depths, applicable to open cut and jacking techniques for construction of sewer systems. Data for several real sewer system construction projects in Taiwan were investigated to verify the accuracy of the cost functions. The cost functions developed in this study are more realistic, practical, accurate and easy to use than existing functions.

**Application of Improved Solow Model for Evaluating Social Benefit of Water Saving Agriculture**

Linlin Chu[1], Jing Chen[1]
[1]*Hohai University, China*

Based on the Solow model, technological progress and capital input are divided, and an improved Solow model is established. This model is applied to calculate the contribution rate of all input factors to economic growth and to evaluate quantitatively the

social benefit of water-saving agriculture in China from 1991 to 2005. It is concluded that the contribution rates of all input factors are obviously different. Among these factors, the contribution rate of technological progress in water-saving agriculture is greater than the capital input of water-saving agriculture. Although periodic fluctuations are evident, the social benefits of water-saving agriculture generally have a stable development process. Water-saving agriculture is currently playing an important role in China.

**An Algorithm for Activity Based Costing Based on Matrix Multiplication**

Paulo Afonso[1], António Paisana[1]
[1]*University of Minho, Portugal*

Activity based costing (ABC) is a costing methodology particularly suitable to deal with manufacturing complexity and diversity. However, an ABC system is still considered a complex and relatively costly method to be implemented. In this paper we present a powerful algorithm for activity based costing based on matrix multiplication. With regard to the use of matrixes and linear algebra, some researchers in the 1960s and 1970s studied cost allocation linking matrix and linear algebra with Leontief's input-output model (e.g. [1] and [2]). The algorithm presented here is an important development, in so far as it is an effective approach to compute product costs and because it offers a simple and flexible algorithm for the design of product costing software.

**Imbalance Between Market Orientation and Innovation Capability: An Empirical Study on Taiwan's Continuing Education**

Shu-Hsien Liao[1], Wen-Jung Chang[1], Chi-Chuan Wu[1]
[1]*Tamkang University, Taiwan*

Though universities appear to be bureaucratic, inefficient and much less flexible organizations, they now have a tough challenge to manage their new adventure—continuing education (CE). This study aims to explore the relationships among market orientation, innovation capability, and business performance in Taiwanese universities and colleges involving CE. We propose research hypotheses and LISREL model to investigate theses based on 261 respondents from 71 universities and colleges. One finding of this study indicates that innovation capability plays a distorter factor in context of the relationship between market orientation and business performance. Such an inconsistent result reveals an imbalance between market orientation and innovation capability. We also find that these two different aspects of innovation all have direct contributions to business performance whereas administrative innovation strongly affects product innovation. This study finally ends with some managerial implications for management and future research.

**Key Interventions in Improving the Throughput Rate of Industrial Engineering Undergraduates: A Case Study at the University of Johannesburg**

Hannelie Nel[1], Antoine Mulaba-Bafubiandi[1]
[1]*University of Johannesburg, South Africa*

Industrial Engineering has moved beyond traditional manufacturing and its scope has expanded to include consulting, banking and healthcare. The demand for Industrial Engineers has increased significantly in South Africa and the Department of Home Affairs has classified Industrial Engineering as a critical and scarce skill. Currently, the fewest number of professionally registered engineers, technologists and technicians are in Industrial Engineering. The throughput of Industrial Engineering undergraduates has therefore become a primary focus of higher institutions in South Africa. This paper presents the key interventions employed by the Department of Industrial Engineering Technology at the University of Johannesburg to improve the throughput rate of its' undergraduate students. Strategic interventions employed by the department increased the throughput rate of students in the National Diploma program by 100% in 2008; these included the development of an academic strategy for the department, appropriate curriculum redesign and an enabling student academic performance management system.

**Quality Assurance of Complex Systems - Satellite AIT**

Adalberto Coelho Silva[1], Geilson Loureiro[1]
[1]*Brazilian National Institute for Space Research, Brazil*

Space programs, in general, present a long development schedule, in which diverse phases must be sequentially fulfilled. One of them is Assembly, Integration and Tests (AIT).
The satellite AIT activities are a logical and interrelated sequence of events – mechanical, electrical and environmental tasks. The main objective in this phase of development of space program is to achieve a high degree of confidence that the satellite complies with his operational objectives, survival to the launch environment, and correct operation during the designed satellite lifetime can be achieved.
In order to reach this goal it is necessary to set forth an AIT Quality Program which applies and coordinates at least the following main points – control of status of test facilities and means of support, strict control to the test execution, formal test analysis and review of test results, ensuring that the Satellite will be free of latent defects.
This paper presents a Brazilian experience on AIT quality assurance, at system level, gets through satellite AIT activities executed at Brazilian National Institute for Space Research (INPE) – Integration and Testing Laboratory (LIT) – the largest satellite testing lab in the South Hemisphere. The paper contains the LIT AIT QA organization; logbooks and records used, system AIT QA main tasks, launch Base and GSE related issues, resuming the lessons learned with system AIT QA activities executed with success at LIT with Brazilian and international satellite programs.

**A Paradigm for Developing TQM-Role Stressors Model and Index**

Pei-Lee Teh[1], Chen-Chen Yong[2], Arumugam Veeri[1]
[1]*Multimedia University, Malaysia*
[2]*University of Malaya, Malaysia*

TQM practices have been increasingly implemented in both manufacturing and service organizations, yet research has neglected the study of role stressors induce from the implementation of TQM practices. Drawing from the extant TQM and role stressors literature, this paper examines the relationship between TQM and role stressors by addressing three critical gaps: (1) conceptualizing the multidimensionality of TQM practices as a preventive approach to role stressors; (2) formulating TQM-Role Stressors index for the use of industrial benchmarking; and (3) constructing a model for assessing the nonlinear influences of TQM on role stressors. This study concludes with a discussion of potential practical applications of the TQM-Role Stressors index and model for longitudinal study aimed at deepening our understanding of the role of TQM practices in reducing undesirable role stressors experienced by employees.

**Economic Design of EWMA Control Chart Using Quality Cost Model Based on ARL**

Yihai He[1], Kai Mi[1], Wenbing Chang[1]
[1]*Beijing University of Aeronautics and Astronautics, China*

Statistical control charts have been widely used in manufacturing industry. The average Run Length (ARL) is a dominating measure of control chart performance. This paper presents an economic designing scheme of Exponentially Weighted Moving Average (EWMA) control chart. In this paper, a cost model of quality cycle is constructed. Then, the scheme of applying response surface methodology (RSM) to search the optimal set of EWMA parameters is presented. When quality cost given by the cost model is reduced to local minimum point, if satisfied, stop searching and the certain parameters set is found. A numerical case is used to illustrate the analysis procedure, and a sensitivity analysis is done to give a perspective of how the changes of system parameters affect the final results.

**Study on IT Outsourcing Relationship Character and Hopfield Neural Network Based Evaluation**

Shouhe Zhang[1], Wenjie Huang[1]
[1]*North China Electric Power University, China*

IT outsourcing is making relationship marketing more special for vendors as partnership has turned up to be a trend, which is becoming the core activity. Based on typical analysis of its risk and business character, the management elements and partnership quality are discussed. Then the index system is put forward and the model is founded for evaluation. The Hopfield neural network system (HNNS) technique is introduced with analytic hierarchy process (AHP) as a creative method for vendors to master the quality and make decisions. The model is characterized by being practically effective and functionally modular. On discussing the merits and deficiencies, the future study and its value for enterprise strategy are indicated.

**The Statistical Performance of Double Sampling X-bar Control Charts for Correlation Data**

Pei-Hsi Lee[1], Chau-Chen Torng[2], Huang-Sheng Liao[2], Chun-Chieh Tseng[2]
[1]*Cheng-Shiu University, Taiwan*
[2]*National Yunlin University of Science and Technology, Taiwan*

Double sampling X-bar control chart (DS) which is a Shewhart-type chart can reduce sample size and detect small process shift fast. In real industries, process observations may be interdependent and correlated, and the statistical performance of DS X-bar chart for the correlated data need to be re-evaluated. This article constructs the calculations of statistical indices of DS X-bar charts for correlation data and performs a comparative study for investigating the performance distinction of DS X-bar charts and other Shewhart-type charts. This comparative study indicates that DS X-bar charts are the best choice for monitoring of correlated data.

**Run-Length Percentiles of Multivariate Poisson Control Charts**

Tsen-I Kuo[1], C.S Lin[1]
[1]*National Kinmen Institute of Technology, Taiwan*

Average run length (ARL) is used to evaluate the performance of control charts. When the process is in-control, the run-length distribution is close to a geometric distribution. Hence, the mean of run-length distribution is ARL. When the process is not in-control, the run-length distribution may deviate from a geometric distribution. The run-length distributions have been studied for univariate and multivariate control charts. However, the run-length distributions of multivariate attribution control charts are lacking. Hence, we will investigate the run-length distribution of multivariate Poisson control charts in this study. The percentiles of the run-length distribution provide more information about the performance of the multivariate Poisson control charts.

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| **Session** | Technology and Knowledge Management 4 |
| **Date** | 12/10/2009 |
| **Time** | 11:00 - 12:30 |
| **Room** | Luxembourg I |
| **Chairs** | Shann-Bin Chang, Kevin Tseng |

**Knowledge and Technology Transfer between Universities and Firms: A Case Study from a European University**
Antonio Aguiar[1], Antonio Reis[1]
[1]*Technical University of Lisbon, Portugal*

This paper analysis a successful case study about knowledge and technology transfer (KTT) that can be taken into consideration by the universities wishing to improve their KTT models. Indeed, once the factors that foster the KTT between universities and firms are identified, it will be possible to act accordingly in order to convert the new knowledge generated by the universities in economic value. Through a case study of an European University, this paper discusses a KTT model and highlights how this model, through its unique structure and its support for innovation has been highly successful in stimulating the transfer of research and technologies from Aveiro University (AU) into business organizations.

**Utilization of Knowledge Management by Medical Device Manufactures in Japan**
Seiya Shimanuki[1], Tomoko Saiki[1]
[1]*Tokyo Institute of Technology, Japan*

The technologies for therapeutic medical devices made in Japan are not highly competitive. Recently, some Japanese companies have achieved breakthroughs in this field. In this study, by using the case of one medical device manufacturer (Terumo), we discuss how the change in the organization affects the creation of knowledge useful for a breakthrough. We focused on the Terumo Business Unit (TBU), which Terumo introduced in 1995 as its business system and analyzed the changes in its patent strategy in comparison with one of its competitors. As a result, an increasing trend in the patentability of the patent applications filed by Terumo after 1995 was observed. An interview regarding the TBU was also conducted. The results suggest that the introduction of the TBU might have intimately affected the "creation of knowledge".

**Selecting R&D Projects for Technology-Based Innovation: An Application of the Core Model Approach**
Michael Tow Cheung[1], Paul F. Greenfield[2], Ziqi Liao[3]
[1]*University of Hong Kong, Hong Kong*
[2]*University of Queensland, Australia*
[3]*Hong Kong Baptist University, Hong Kong*

To optimize the use of knowledge when selecting R&D projects for technology-based innovation, all possible techniques – whether based on mathematical programming, or behavior, organization and information, or strategic consistency and integration – should be considered. We present a readily operationalized and flexible approach to this task, under which different project selection techniques are rendered comparable with reference to the normative methodology in economics and relevance to a core-model description of the real world in any application.

**Design of Enhanced Software Protection Architecutre by Using Theory of Inventive Problem Solving**
Song-Kyoo Kim[1]
[1]*Samsung Electronics Co. Ltd, South Korea*

This paper is dealing with the stochastic maintenance method for the software protection by using the closed queueing model with the unreliable backups. The method shows the theoretical software protection scheme in the security perspective. If software application modules are represented as backups under proposed architecture, the system can be solved by using the stochastic maintenance model with main unreliable and random auxiliary spare resources with replacement policies. In addition, the practical approach of technology enhancement in software engineering by using technology innovation tools. TRIZ is a methodology and model-based technology for generating innovative ideas and solutions for problem solving. The results are demonstrated in the framework of optimized software allocation problems with unreliable backups.

**The Role of Knowledge-intensive Business Service in the Evolution of Cluster Network Structure: An Empirical Study from China Socks Cluster**
Haiyan Zhu[1], Jiang Wei[2]
[1]*Capital University of Economics and Business, China*
[2]*Zhejiang University, China*

This paper employs longitudinal case study research to investigate why and how KIBS embeddings impact the evolution of industrial cluster's network structure. The paper answers these intrinsic research questions by examining how network structure of Datang socks cluster located in southeast China, evolutes under the influence of KIBS embedded from 2003-2007. Initially, in order to explore the functional mechanism, KIBS embedding process of each development phase has been analyzed. Next, SNA and UCINET software have been used to unveil the process of the change of cluster network structure, such as network density, network between centrality and network agglomeration. Finally, we summarize the KIBS' functional mechanism by KIBS' ability to influence some important variables and optimize cluster network structure, which provides solid advice to policy makers.

**Prioritizing Critical Factors of Team Innovation – The Application of Grey Relational Analysis**
Lien-An Hsu[1], Chien Chiang Lin[2], Ting-Chun Lu[1], Hsu-Feng Hung[1]
[1]*National ChengChi University, Taiwan*
[2]*Shih Hsin University, Taiwan*

Several factors might affect team innovation. However, it would be of great importance to thoroughly understand the effects of different factors on team innovation. Based on an extensive review of literature, 20 factors that might affect team innovation were selected from previous studies. Through expert survey, the researchers utilized grey relational analysis (GRA) to investigate the importance of those factors. According to the results of GRA, the researchers listed several critical factors of team innovation. Those critical factors could be used for further studies to construct comprehensive models and to examine relationships among those factors and team innovation.

**Taiwanese and Norwegian Engineering Students' Self-Image of Academic Abilities, Grades and Course Satisfaction**
Hua-Li Jian[1], Frode Eika Sandnes[2]
[1]*National Cheng Kung University, Taiwan*
[2]*Oslo University College, Norway*

This study addresses the reliability of engineering students' evaluations of courses. The hypothesis is that students' evaluations of courses are affected by their grades. Students that obtain good grades are more likely to rate a course favorably than students who get lower grades. Moreover, the results indicated that self image of academic abilities differ across cultures as the Norwegian students studied had an inflated image of their abilities compared to that of Taiwanese students. One implication of this study is that results from certain student evaluation questionnaires should be interpreted with caution. Ranking of teachers based on such results should be avoided.

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| **Session** | Technology and Knowledge Management 5 |
| **Date** | 12/10/2009 |
| **Time** | 13:30 - 15:00 |
| **Room** | Luxembourg I |
| **Chairs** | Yung-Hsin Chen, Hong-Feng Lai |

**Knowledge Management Process and New Product Development Performance in a Malaysian Research and Development Organisation**

Wan Amal Wan Zaaimuddin[1], Gerald Guan Gan Goh[1], Uchenna Eze[1]
[1]*Multimedia University, Malaysia*

New product development is a necessity for organizations to remain competitive and stay abreast of competition. However, in order for these initiatives to be successful, it is exigent that the factors that contribute to superior new product development performance are identified. With the use of surveys and a census sampling approach within an R&D organization in Malaysia, this study provides empirical evidence on the relationship and influence of both knowledge management process and new product development strategy on an organisation's new product development performance. The findings of this study are useful to product development engineers and researchers as it provides insights on the issues to be examined in such endeavours.

**Knowledge Decision Support Model for Collaborative Product Innovation**

Yu yang[1], Xuedong Liang[1], Jie Yang[1], Zijun Zhou[1], Jing wang[1]
[1]*Chongqing University, China*

Recently, interests in the notion of collaborative product innovation (CPI) from academia and industry have been significantly increased. Comprehensive requirements analysis along with a cogent framework, however, do not address the problem that how to support product innovation with the distributed knowledge resources. Therefore, a knowledge decision support model is proposed including collaborative knowledge database setting, knowledge mining and innovative design support. Accordingly, customer knowledge and requirements, product character, prototypes and instances are pushed to product innovator actively. The validity of the model is illustrated with an example of motorcycle innovation design.

**Process-based Structuring Knowledge in Product Development**

Qian-Wang Deng[1], Li-Ping Yang[1], Xin-Wei Wang[1]
[1]*Hunan University, China*

Efficient knowledge management is a key success factor for product development. A basic idea behind knowledge management is to construct a global architecture of knowledge. Product development process modeling can help knowledge engineers structure knowledge. A so-called "state-process-resource" model in the product development domain is proposed. The results of a product at the intermediate-stages are called product states. Process elements, allocated with corresponding resources, transform the product states from one to another. According to the "state-process-resource" model, knowledge is hierarchically categorized into six subjects: products, processes, methods, tools, specific application domain, and other resources. These six subjects of knowledge are inter-relational.

**Adaptability Design to Meet Dynamic Customer's Needs**

Nattawut Janthong[1], Daniel Brissaud[1], Suthep Butdee[2]
[1]*University of Grenoble, France*
[2]*King Mongkut's University of Technology North Bangkok, Thailand*

The customer is the core element of business based on current market situation, even for industrial equipment which customers' requirements are now very various. It means that the inside processes of the manufacturer should adjust to customer's requirements: the company must be very flexible among other properties. The challenge is that the flexibility comes from the management of the knowledge of the company by improving the adaptive design process. A knowledge-based design process has been developed by combining the axiomatic design and case-based reasoning approaches, to enhance the performance of the design personnel and is the key factor for the success of the company.

**An Analysis on the Indian Government Policies in 2007 - For Sustained Growth of R&D Activities**

Narayanan Srinivasan[1]
[1]*Jawaharlal Nehru Technical University, India*

India's increased economic intellectual resources and encouraging government policies attracted large global industries to invest and establish their R&D activities in India. Strategic initiatives by MNC (Multinational Corporation) to penetrate large Indian middle income consumer market through Economies of Scale require localized product updates and compliance to government regulations. MNC's established some R&D centers utilizing India's core competency in service sectors and democratic structure of Indian government. India also realizes that it has to focus on infrastructures development and increase the Research & Development (R&D) activities to develop critical technologies and new products & system to sustain the economic growth. India's economic growth has an inherent focus on R&D activities, need further reforms in its policy to update across different industrial sectors to attract further Foreign Direct Investment (FDI) compared to other developing Asian countries. Major R&D investments made by MNC's in India is compiled and analyzed in this article in the year 2007 as sample.

**IRB System for Assisting the Development of Intelligent Medical Devices**

Kevin Tseng[1], Chien-Lung Hsu[1]
[1]*Chang Gung University, Taiwan*

This research aims to develop an IRB system and expects that the developed system could be useful for assisting the development of intelligent medical devices, effective and speedy access to IRB certification, and easy manage clinical trails. The developed system provides the mechanism to assist communication and cooperation between trial investigator and manufacturers through a meeting system and online conference system. Hence, trail investigator and clinical professionals could use the developed system to obtain IRB certification and implement clinical trials, to develop good intelligent medical devices to meet users' needs.

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| **Session** | Technology and Knowledge Management 6 |
| **Date** | 12/10/2009 |
| **Time** | 15:30 - 17:00 |
| **Room** | Luxembourg I |
| **Chairs** | Jiang Wei, Hung-Yi Chen |

**Customer Value Propositions for Technology Commercialization: Investigating the Feasibility of a Real Options Approach**
Marc Wouters[1]
[1]*University of Twente, Netherlands*

The value of new technology is uncertain, and technology suppliers and buyers should combine their knowledge to focus the innovation for creating maximum value. To facilitate such cooperation, they can agree beforehand a pricing mechanism based on customer value, which will materialize once a new process that is based on the R&D firm's technology is implemented, or new products or services based on this technology are brought to the market. To structure a value-based agreement, real options models can be used, because these allow modeling different future scenarios, decisions that will be taken depending on these, and payoffs. Conditions are discussed under which value-based agreements can be made. More empirical research is needed to find out how such agreements can be structured and what benefits such agreements bring.

**Theoretical Study on Technology Threat Early Warning Management**
Yuangen lai[1]
[1]*Institute of Scientific & Technical Information of China, China*

With the upgrading of technology importance in social-economic development, technology threat has become an important part of an organization's exterior threat. How to effectively identify and assess the threat and its possible impact is directly related to the interests and security of an organization. Up to date, there is little research about technology threat between different organizations. In the present study, we first analyze the technology threat, including its formation mechanism, type classification, manifestation and impact factor. From the perspective of technology development, technology threat can be classified into three types: technology gap threat, technology diversity threat and technology R&D threat. A three-dimensional model of impact factor of technology threat has been constructed. Secondly, we put forward a process of early warning management of technology threat, and build its index system including 6 first-grade indicators and 22 secondary indicators.

**Analyzing Inter-Firm Networks for Enhancing Large-scale Regional Clusters**
Junichiro Mori[1], Yuy Kajikawa[1], Ichiro Sakata[1]
[1]*The University of Tokyo, Japan*

In this paper, we analyzed structures of large-scale inter-firm networks in the Kanto and Koshinetsu areas which are the largest economic blocks in Japan. We found a structural difference among prefectures. The network structure showed that some prefectures are intensively developing their internal network connections. Some prefectures that are less connected to the center have a room to improve networking for the regional clusters. In addition, even among such prefectures, there is a clear difference in terms of their network positions. Some have high network centralities and is maintaining certain amount of connections to other prefectures. Others have less such external connections, which could raise a chance to accelerate the regional clusters by bridging such gap.

**A Model of the Determinants of Purchase of Home Security and Remote Control Equipments**
Kuo-Shun Sun[1], C. N. Huang[2], Y. B. Chen[1]
[1]*Kainan University, Taiwan*
[2]*Central Police University, Taiwan*

The study extends the original technology acceptance model (TAM) by applying it to the purchase intention of home security and remote control equipments, and introducing two external variables, "task-technology fit" and "reliability and interaction." The paper addresses the original cognitive TAM variables, and then revises them by adding emotional antecedents which fit into consumer context. The hypotheses incorporating all of the variables and the relationships among the variables are tested in the study of consumer behavior, and supporting evidence is found for TAM. Thus, the findings of the study reveal that TAM is stable across contexts and additional variables help explain the technology acceptance by consumer in personal scenarios.

**The Effects of Interfirm Network on Firm Growth: A Case Study**
Xinmin Peng[1], Haiting Huang[2]
[1]*Zhejiang University, China*
[2]*Zhejiang Textile & Fashion College, China*

Interfirm network is the basis of getting sustainable competitive advantages over other industries by obtaining a variety of knowledge resources, and it is also the prerequisite and foundation of winning the growth and development of enterprises. In this paper, after recalling the theory of interfirm network and based on it, the author analyzes the different effects on firm's early growth and development caused by social network and large sparse network relationship according to the related interfirm network theory , and makes a matching analysis in the two relationship patterns through the case study of CHINT Group. The author makes a conclusion that at the original stage, the firms employed close social relationship network and at the early stage, the close and simple sparse relationship is adopted, while at the mature stage, the firms use complex multi-level large sparse network.

**Construction of Knowledge Based Engineering Platform for Armored Vehicle**
Guoxin Wang[1], Yan Yan[1], Lichen Hu[2], Xiang Zhang[1], Lu Wang[1]
[1]*Beijing Institute of Technology, China*
[2]*China North Vehicle Research Institute, China*

Armored vehicle design involves various aspects of technical knowledge and experience. To effectively manage and share this knowledge and experience throughout the entire development process, a methodology of construction of knowledge based engineering (KBE) platform for armored vehicle is proposed. In this methodology proposed, architecture of the knowledge based engineering platform and category of armored vehicle knowledge are first presented. And then, the modeling, storage and retrieval for each type of knowledge are illustrated. The ontology is adopted to create the innovation design knowledge base. Combing the case-based reasoning (CBR) with function-structure mapping method to construct the reuse design knowledge base. Design process integration technique is applied to build the typical design problem solving knowledge base. Finally, a practical case study is presented to introduce the operations of the knowledge based engineering platform for armored vehicle.

**The Mechanism of Innovation Capability Leveraging Via Strategy in SMEs**
Litian Chen[1], Qingrui Xu[1]
[1]*Zhejiang University, China*

In some enterprises, the main problem that hinders the leverage of innovation capability is lacking the absorptive capability, which is usually caused by the high turnover rate of R&D talent. The root cause is the variance in strategic direction, which actually has negative effects on technological innovation. However, the research of enterprises' innovation capability leverage is still in the exploration. Concerning the problems in enterprises, based on the previous study at home and abroad, this paper focuses on how to leverage innovation capability through strategy. From the previous studies and two explorative case studies, a problem-oriented model is established, which focuses on how to leverage innovation capability through strategy. The hypotheses are proposed and tested by data from 420 small and medium sized enterprises that respond to our questionnaire. At last, some suggestions about how to leverage enterprises' innovation capability are proposed.

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| **Session** | Production Planning and Control 1 |
| **Date** | 12/10/2009 |
| **Time** | 11:00 - 12:30 |
| **Room** | Luxembourg II |
| **Chairs** | Stuart C. So, Martin Grunow |

**Designing a Fuzzy Rule-based System for Selecting the Proper Lot-sizing Technique**
Soheil Sadi-nezhad[1], Leila Bashshash[1]
[1]*Islamic Azad University, Iran*

In this paper, we implement a system for selecting the proper lot-sizing technique based on Fuzzy Inference Systems (FIS). Among ten commonly known lot-sizing techniques, this FIS considers Input variables such as set-up cost, holding cost, planning horizon, lumpiness and BOM level which are modeled as linguistic variables by using fuzzy sets. The strength of the model is the priority level that is allocated to each technique as the output variables. The work is accompanied by two examples that show how to apply this approach. The model is developed using MATLAB software.

**The Patent Design Around Method Based on TRIZ**
Ping Jiang[1], Jinjin Zhai[1], Zishun Chen[1], Runhua Tan[1]
[1]*Hebei University of Technology, China*

The patent design around is key to the company when launch a new product. So product development must not impinge the patent right. TRIZ is a power tool for patent analysis and innovation. The evolution patterns and routes help design to find out current technologies' developing status and imply the next developing level of the technologies. The problem is found out with consideration of how to achieving the next generation of technology. The contradiction solving principles is the tool to help designer get primal solution for the innovation. The design solution which design around existing patents and have higher perform would construct by contradiction matrix and inventive principles. The belt conveyor is a case study and developed to improving the performance without impinging existing patent.

**Enhancing Local Scheduling Rules with a Global Benefit Factor**
Jörg Sigrist[1], Christoph Heitz[1]
[1]*Zurich University of Applied Sciences, Switzerland*

We propose a new extension for index based scheduling rules which adds a global system perspective by estimating how much a job could benefit from an immediate processing. We implement this criterion in the ATC rule and compare the performances of the standard ATC and the extended rule ATCG. It is shown that ATCG performs better than ATC, especially when system loads are high and processing times follow a uniform distribution.

**Modeling Intermediate Product Selection Under Production and Storage Capacity Limitations in Food Processing**
Onur Alper Kilic[1], Renzo Akkerman[2], Martin Grunow[2], Dirk Pieter Van Donk[1]
[1]*University of Groningen, Netherlands*
[2]*Technical University of Denmark, Denmark*

In the food industry products are usually characterized by their recipes, which are specified by various quality attributes. For end products, this is given by customer requirements, but for intermediate products, the recipes can be chosen in such a way that raw material procurement costs and processing costs are minimized. However, this product selection process is bound by production and storage capacity limitations, such as the number and size of storage tanks or silos. In this paper, we present a mathematical programming approach that combines decision making on product selection with production and inventory planning, thereby considering the production and storage capacity limitations. The resulting model can be used to solve an important practical problem typical for many food processing industries.

**Worker Productivity, Occupational Health, Safety and Environmental Issues in Thermal Power Plant.**
Hole Jitendra[1], Mukesh Pande[1]
[1]*Rajiv Gandhi Technological University, India*

The main objective of this research was to identify factors that affected worker productivity, occupational health and safety in thermal power plant in Maharashtra. Thirty production managers participated in the study. Fifty-two percent of the managers reported hot environmental conditions, 30% a noisy environment, and 26% a lack of resources and facilities. Managers received worker complaints of fatigue, back pain, upper-body pain, hand and wrist pain and headaches. Management (85%) acknowledged not having knowledge or access to ergonomics information. Ninety percent of the companies did not carry out ergonomic assessments. A significant correlation ($p < 0:01$) was found among productivity indicators and health and organizational attributes. Lack of skills in ergonomics and training, communication and resources are believed to be some of the factors contributing to the poor ergonomic conditions and consequent loss of worker productivity and reduced health and safety in the Thermal Power plants.

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| **Session** | Production Planning and Control 2 |
| **Date** | 12/10/2009 |
| **Time** | 13:30 - 15:00 |
| **Room** | Luxembourg II |
| **Chairs** | Soheil Sadi-nezhad, Carman Lee |

**A Computational Framework for Learning Production Planning Policies**
Srinivas Narasimhamurthy[1], Durga Prasad Muni[1]
[1]*Infosys Technologies Limited, India*

In a variety of production settings in industries such as consumer packaged goods (CPG), pharma and other consumer goods, a number of related items are produced together in the same production mode. The production of these families require setup of capacities, which can incur significant costs in terms of labor, material, etc. Hence production planners are faced with the challenge of determining production quantities and the sequence of changeovers so as to achieve an optimal long-term cost-containment strategy. In this paper, we detail the problem formulation and a simulation based policy learning framework. We also discuss the results of our computations performed using this framework.

**Scheduling Utility Workers at Mixed-Model Assembly Lines**
Rico Gujjula[1], Hans-Otto Guenther[1]
[1]*Technical University of Berlin, Germany*

One of the main performance parameters for sequencing workpieces at mixed-model assembly lines is utility work, i.e. the amount of work a worker can't process within the limits of his station. A common assumption in literature is that utility work is compensated by utility workers, but a dedicated scheduling of utility workers is usually neglected. This paper attempts to fill this gap by presenting a new anticipative scheduling approach, which is compared to a traditional real-life approach. It is shown that schedules of the anticipative approach require a lower number of utility workers to cope with the utility work at an assembly line.

**Modeling a PCB Assembly Line with Modular Reconfigurable Placement Machines**
Aiying Rong[1], Attila Toth[2], Olli Nevalainen[1], Risto Lahdelma[1], Timo Knuutila[1]
[1]*University of Turku, Finland*
[2]*University of Szeged, Hungary*

In this paper, we consider the combined task of determining a favorable machine configuration and line balancing for a single assembly line where a single type of PCB is assembled with a set of interconnected, reconfigurable machine modules. First, we formulate the problem as a non-linear integer programming model with the objective of minimizing the cycle time. Then we transform it into a linear model to obtain the solution. Finally, we illustrate the effectiveness of the model by numerical tests and compare the optimal solution from our model with evolutionary algorithm.

**The Research on Job Shop On-line Scheduling with Random Release-date**
Jing Yin[1], Baojiang Chen[1]
[1]*Beijing University of Civil Engineering and Architecture, China*

For the job shop on-line scheduling in which the release dates of jobs are stochastic distributed, the hybrid scheduling strategy that integrates the interval rolling mechanism with the key event-driven is introduced. The satisfactory solution can be obtained through iterative optimization by embedding the neighborhood search into the constraint satisfaction solving procedure. The simulation and computational results verified that the scheduling method proposed in the paper can meet the requirements of both efficiency and stability.

**Research on MRP/JIT Integration and Application in Medical Equipment Production Management Concerned with Spare Part Manufacturing**
Qinghua Zhang[1], Guoquan Cheng[1], Zhuan Wang[1], Bo He[1]
[1]*University of Science and Technology Beijing, China*

In the electromechanical production industry, especially in medical equipment manufactories, the mixed production of the original equipment and the maintenance spare part is very common. The implementation priority of the original equipment is higher than the maintenance spare part. In addition, the implementation and control of the production planning of maintenance spare part are restricted by the original equipment production. They could lead to the failure of the spare part's production planning. In order to solve this type of problem, this paper proposes the MRP/JIT integration solution that can be applied in workshop production. In this solution, the production of the original equipment is controlled by MRP, while the spare part by JIT. The work flow of the material supply is also reengineered with material procurement Kanban and material requirement Kanban. The result showed that the feasibility of the production planning had been improved.

**An Integrated Approach to Lot Sizing and Cutting Stock Problems**
Mohsin Malik[1], Min Qiu[1], John Taplin[1]
[1]*University of Western Australia, Australia*

Various industries consist of the cutting stock and lot-sizing problems in successive stages. Traditionally, these two problems are dealt separately which may adversely affect the overall performance of the supply chain. In this paper, an integrated approach is advocated and a model is proposed to jointly optimize the changeover, inventory holding cost and trim loss for a paper mill. It also defines the sequence of the cutting patterns to be used during conversion process. Moreover, the relationship between the ensuing cycle service levels and the total joint costs is also discussed.

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| **Session** | Production Planning and Control 3 |
| **Date** | 12/10/2009 |
| **Time** | 15:30 - 17:00 |
| **Room** | Luxembourg II |
| **Chairs** | Christoph Schwindt, Songlin Chen |

**A Mathematical Model for Workload Distribution and Balance with Setup Times Under Finite Capacity Constraints**

Yunfang Peng[1], Zailin Guan[1], Jianhua Tao[2]
[1]*Huazhong University of Science and Technology, China*
[2]*Guangzhou University, China*

Production planning is a challenging problem for enterprises especially in the high-mix and low-volume production environment. Finite capacity scheduling tries to allocate resources over time to perform a set of tasks such that precedence constraints and resource capacity constraints are not violated, and overall deadline goals are met to the best extent possible. A novel mathematical model for workload distribution and balance with setup times under finite capacity constraints is present. This model considers setup times and alternate resources, which makes it more comprehensive than others. The objective is to minimize the delay time, early time and cycle time. This model is solved by an optimization software called Xpress-MP. An example is given to illustrate its practicability.

**Integrated Design Structure System for Modular Design in Products Development**

Chung-Shing Wang[1], Wei-Hua Wang[1], Teng-Ruey Chang[1], Ming-Ching Lin[1]
[1]*Tung-Hai University, Taiwan*

To make the product design project plan has an explicit direction is a crucial point in the process of a product innovative development. This study applies contradiction matrix and single technical feature method from theory of inventive problem solving (TRIZ) to find out appropriate solution for design process. Furthermore, this study constructs design structure matrix (DSM) and expresses the relations between components by applying matrix partition and matrix rearrangement. Through interpretive structural model (ISM), it calculates and transforms the plotted diagram of component interaction and draw the hierarchical interaction graph. It gains a better modular grouping result and shows the result by graphical method mode. In addition, it applies modular design concept to construct common parts for creating product varieties. An implementation of using motor treadmill can create product varieties and help to cut down product development pace effectively.

**Scheduling Asphalt Highway Construction Operations Using the Combination of Line-of-Balance and Discrete Event Simulation Techniques**

Gul Polat[1], Yalcin Buyuksaracoglu[2], Atilla Damci[1]
[1]*Istanbul Technical University, Turkey*
[2]*Polimeks Construction, Turkey*

Linear construction projects typically consist of several repetitive activities and have the same operations repeated at each unit. Traditional scheduling techniques are found to be inadequate to solve scheduling problems of such projects. Linear scheduling methods are well suited to the characteristics of linear construction projects. Line-of-Balance is one of these linear scheduling methods. Asphalt highway construction project may be a good example for a linear project. The main objective of this study is to handle the scheduling problem of both on-site and off-site operations of a 4 km long and 14 m wide asphalt highway project using the combination of line-of-balance and discrete event simulation techniques. It is found that the studied project could be completed within at least 17 days using the resources owned by the contractor company. Moreover, the developed simulation model enables the contractor to estimate the arrival times of the trucks that would provide an uninterrupted work flow.

**A Heuristic Approach for Short Term Operations Planning in a Catering Company**

Poorya Farahani[1], Martin Grunow[1], Hans-Otto Guenther[2]
[1]*Technical University of Denmark, Denmark*
[2]*Technical University of Berlin, Germany*

Certain types of food such as catering foods decay very rapidly. This paper investigates how the quality of such foods can be improved by shortening the time interval between production and delivery. To this end, we develop an approach which integrates short-term production and distribution planning in a novel iterative scheme. The production scheduling problem is solved through an MILP modeling approach which is based on a block planning formulation complemented by a heuristic simplification procedure. Our investigation was motivated by a catering company located in Denmark. The production configuration and the processes assumed in our numerical experiments reflect real settings from this company. First numerical results are reported which demonstrate the applicability of the proposed approach.

**Modelling the Long Term Impact of Existing Products on Perceived Value of New Products**

Bingwen Yan[1], Oluwole Daniel Makinde[1]
[1]*Cape Peninsula University of Technology, South Africa*

Innovation, continuous improvement, and changes forced by economics factors and marketing conditions are essential elements for bringing new products successfully in the marketplace; however, market competition with the existing products may have along term impact on the perceived value of the new products. Moreover, whether introducing new products/services or upgrades of existing products/services, better profit can be achieved by applying Lean product development technique and evaluating the long term impact of existing products on perceived value of new products will contribute in maintaining the desired profit margin. In this study, a two compartmental deterministic mathematical model for assessing the long term impact of existing products on perceived value of new products is proposed and analysed qualitatively. Numerical simulations support our analytical conclusions and illustrate possible behaviour scenarios of the model.

**Engineering Adaptive Production Control Strategies for Complex Discrete Manufacturing – with an Illustration from the EMS Industry**

Christoph Karrer[1], Knut Alicke[2], Hans-Otto Guenther[1]
[1]*Technical University of Berlin, Germany*
[2]*Karlsruhe Institute of Technology, Germany*

Shopfloor reality shows that many companies with complex discrete production systems have not yet found a satisfying approach to production control. Even though a large variety of theoretical approaches exists in literature, many companies do not engineer an individual production control strategy (PCS), but stick to sub-optimal standard logic provided by their Enterprise Resource Planning (ERP) software or to simple Kanban systems, what leads to sub-optimal operational performance. We illustrate this chal-lenge with a case study from industry and present an ongo-ing research effort to develop an engineering process to de-rive, parameterize, and update individual PCS. The process relies on a systems analysis perspective we propose and a simulation framework we developed. Important feedback loops known from Lean Manufacturing are considered. The vast solution space is explored starting from a simple hypo-thetical production system. Later, complexity drivers are stepwise reintegrated and the found dominant PCS is refined accordingly.

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| **Session** | Reliability and Maintenance Engineering 4 |
| **Date** | 12/10/2009 |
| **Time** | 11:00 - 12:30 |
| **Room** | Luxembourg III |
| **Chairs** | Vahid Ebrahimipour, Yung-Chung Chen |

**A Simple Approximation of the Weibull Renewal Function**
Renyan Jiang[1]
[1]*Changsha University of Science and Technology, China*

This paper proposes a simple approximation for the renewal function of the Weibull distribution with an increasing failure rate (i.e., the shape parameter being larger than one). It is developed for using in optimization of preventive maintenance policies. The approximation is a weighted geometer average of the cumulative distribution and hazard functions, and its weight parameter is a function of the shape parameter. The approximation is accurate for t up to a certain value of larger than the scale parameter.

**Cluster Analysis of Maintenance Management Problems**
Renyan Jiang[1]
[1]*Changsha University of Science and Technology, China*

Some problems in maintenance management and decision need to classify a set of items into several classes based on some criteria. This paper presents a simple, straightforward and intuitive cluster method to solve such problems. The proposed method is different from but somewhat similar to the K-means approach. The main advantage is that it does not need iteration. Three real-world examples are included to illustrate its appropriateness and usefulness.

**Using Dynamic Bayesian Networks for Prognostic Modeling to Inform Maintenance Decision Making**
Ken McNaught[1], Adam Zagorecki[1]
[1]*Cranfield University, United Kingdom*

In this paper, we consider the application of dynamic Bayesian networks to the prognostic modelling of equipment in order to better inform maintenance decision-making. We provide a brief overview of Bayesian networks and their application to reliability modelling. An example is then provided in which an equipment is considered to be in one of six states and there are two imperfect condition monitoring indicators available to provide evidence about the equipment's true state which tends to deteriorate over time. With this example, we show how the equipment's reliability decays over time in the situation where repair is not possible and then how a simple change to the model allows us to represent different maintenance policies for repairable equipment.

**An Analysis of s-t Reliability for Wireless Networks Under Outage Conditions**
Young C. Park[1]
[1]*Baekseok University, South Korea*

The ATN (Army Tactical Network) system, which provides communications for mobile users, uses a flood search routing algorithm to locate a path from the caller to the called party, inherently providing alternate routing around outages, and thus providing a survivability. The network performance measures are are functions of reliabilities of the network elements. In this paper we analyze s-t reliability for wireless which uses a flood search routing algorithm with a frequently called list (FCL) to route calls and packets, under node or link outage. We evaluate connectivity and reliability of calls as performance measures. The flood search algorithm performs very well in routing traffic around disabled links and nodes.

**A Hybrid Prognostics and Health Management Approach for Condition-Based Maintenance**
Huiguo Zhang[1], Rui Kang[2], Michael Pecht[2]
[1]*Beihang University, China*
[2]*University of Maryland, United States*

Condition-based maintenance (CBM) is an efficient proactive maintenance strategy based on actual conditions obtained from in-situ, non-invasive tests, and operating measurement. In recent year, prognostics and health management (PHM) has emerged as one of the key enablers for achieving efficient system-level maintenance and for lowering life-cycle costs. This paper overviews methodology of physics-of-failure (PoF) approach and categorizes data-driven approach for the PHM application, summarizes their advantages and disadvantages respectively, and presents a hybrid prognostics approach which incorporate both the advantages of PoF and data-driven approaches for condition-based maintenance.

**Availability Assessment of Stochastic Multi-states Systems Based on UGF and Taking Into Account Data Uncertainty**
Mazen El Falou[1], Eric Chatelet[1]
[1]*Université de technologie de Troyes, France*

The presented method extends availability assessment in multi state systems to take into account data uncertainty. Until now, propagation of uncertainty is evaluated only in the classical block diagrams methods or specific simulation modeling. Using the universal generating function technique (UGF), the number of states in the multi states model is reduced and the uncertainty evaluation is generalized. Markov processes describe the multiple degradation states of components (with exponential laws) which are combined with UGF to generate the system states. The reparations are also taking into account in terms of exponential laws. The data uncertainty is modeled by usual probability functions. The results show the influence of these uncertainties on the probability states, availability assessment and consequently the decision for system design or maintenance policy. The suggested method is sufficiently general to cover many types of systems and application processes.

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| **Session** | Global Manufacturing and Management 1 |
| **Date** | 12/10/2009 |
| **Time** | 13:30 - 15:00 |
| **Room** | Luxembourg III |
| **Chairs** | Jun-Der Leu, Tritos Laosirihongthong |

**Identifying Informal Communities and Leaders for Total Quality Management Using Network Analysis of Email**
Junichiro Mori[1], Hisato Tashiro[1], Kazuo Haraoka[1], Katsumori Matsushima[1]
[1]*The University of Tokyo, Japan*

Global communication networks with internet and email have changed the nature of community and leadership communication style within an organization. For TQM-based organizational innovation, it is a key issue to identify communities of practice and deploy adequate leaders within the communities in the global communication. For effective TQM activities with leadership, we propose a method for indentifying informal communities and potential leaders from email data. In a clustering process, we have detected informal communities and hierarchical structures. Network centrality characterizes members of the informal communities within the structure of the email network. These measures contributed to identify leadership roles with the informal communities. According to the results of a case-study with actual email data of a firm, we discuss how our method can be applied for TQM-based organizational management that could lead to innovation.

**Foreign Exchange Exposure-Based Strategy Building for Non-financial Corporations**
Wen Song[1], Min-Hsiu Tsai[1], Junzo Watada[1]
[1]*Waseda University, Japan*

In the presence of deviations from parity conditions, the influence of foreign exchange rate variability beyond the range of financial companies only, and now represents to be an important source of risk for nonfinancial corporations. This research takes Japan as an example and examines how foreign currency movements affect Japanese manufacturing companies. From firm and industry perspectives, we find 16% of 65 sample companies and three out of six sub sectors of manufacturing industry experienced an economically significant effect from exposure to the U.S. Dollar, the Chinese Yuan, or the European Euro from January 2002 to December 2007. Based on the findings, we propose a hedging method using real options analysis and a binomial decision tree model as a strategy to mitigate the impact of exchange rate exposure, which illustrates that options theory can provide useful financial hedges by introducing adjustment costs or providing faster adjustment procedures.

**TQM and Organizational Management Practices: Are They Really Complementary?**
Prattana Punnakitikashem[1], Tritos Laosirihongthong[2], Dotun Adebanjo[3], Michael Mclean[4]
[1]*Mahidol University, Thailand*
[2]*Thammasat University, Thailand*
[3]*University of Liverpool Management School, United Kingdom*
[4]*Queensland University of Technology, Australia*

The objective of this research is to explore if TQM firms execute various organizational management practices significantly different from non-TQM firms in the ASEAN automotive supply chain. Datasets were collected from ASEAN automotive Original Equipment Manufacturers (OEMs) and their Tier 1 and 2 suppliers. Then, datasets were tested by using statistical analysis. The results show that seven TQM practices including leadership, strategy and planning, customer focus, information and analysis, people management, process management, and supplier involvement are significantly higher in TQM firms than Non-TQM firms. ASEAN OEM suppliers in the automotive industry can use the results of this study to select and deploy suitable TQM practices to enhance their competitiveness in the first instance in the automotive sector and then to other value-adding sectors. This study also indicates that automotive industry and others need to consider TQM practices, as an organizational innovation or organizational development intervention, along the entire supply chain.

**Global Supply Network Configuration Using Air-cargo Free Trade Zones: A Simulation-based Approach**
Jun-Der Leu[1], Yu-Tsung Huang[1], Min-Hui Chen[1]
[1]*National Central University, Taiwan*

A Free Trade Zone (FTZ) is an economic zone that an international business can utilize to optimize its supply network. It provides the advantages of operation efficiency as well as financial benefits. For these reasons, many international businesses choose to locate their manufacturing factories or distribution centers in an FTZ. However, the deployment of business sites in such an area necessitates the re-designing of their supply network and also requires decision support analysis. In this study, we develop an economics evaluation model and a simulation model for the use of an air-cargo FTZ by an international business. The feasibility of the two models is illustrated by applying them to an international business. The results show how the global supply network is re-configured after the application of air-cargo FTZs.

**An Integrated Product Development Platform Based on STEP and PDM**
Wanling Chen[1], Shane Xie[1], Fenfang Zeng[2]
[1]*University of Auckland, New Zealand*
[2]*Huazhong University of Science and Technology, China*

In today's highly competitive global economic environment, integration plays an important role in enterprise strategy, and its benefits are enormous. The conventional integration technologies have limitations for supporting information exchange and sharing in various stages of product development process. This has led to issues such as data format incompatibility, one-way and static integration. This paper proposes an integrated platform developed based on the STandard for the Exchange of Product data (STEP) and Product Data Management (PDM) to overcome these issues. The goal of the research is to provide an open and extensible infrastructure for dynamical and bidirectional product data exchange and sharing. A multi-layer reconfigurable architecture for the integrated platform is proposed. One of the key issues about process modeling is discussed, which is solved by a proposed workflow modeling method. A prototype version of the platform has been developed and demonstrated with case studies.

**Prominent Network Position: Value Creation and Value Protection**
Ye Zhan[1], Xiaobo Wu[1], Ru-yan Hong[1]
[1]*Zhejiang University, China*

The challenge of interfirm network management has prompted firms to design a dedicated alliances network with desirable properties in order to deliver maximum value. By using a longitudinal case study, this paper shows strategic action a firm may take to construct and motivate a prominent network position through alliance with multiple well-endowed partners. More specifically, it discusses networking strategies regarding network membership, tie modality and network structure in terms of value creation and value protection.

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| **Session** | Global Manufacturing and Management 2 |
| **Date** | 12/10/2009 |
| **Time** | 15:30 - 17:00 |
| **Room** | Luxembourg III |
| **Chairs** | Shengquan (Shane) Xie, Prattana Punnakitikashem |

**A Review of Theoretical Perspectives in Lean Manufacturing Implementation**

Prattana Punnakitikashem[1], Nisakorn Somsuk[2], Dotun Adebanjo[3], Tritos Laosirihongthong[2]
[1]*Mahidol University, Thailand*
[2]*Thammasat University, Thailand*
[3]*University of Liverpool Management School, United Kingdom*

This paper provides a broad overview of the literature on theoretical perspectives in the context of lean manufacturing. Four organizational behavior (OB) theories (contingency theory, resource based view theory, institutional theory, and transaction costs theory) were reviewed and analyzed how these theories support the implementation of global manufacturing strategy. The results of this study also provide opportunities for future inquiry of theory-based research in operations management.

**House of Strategy: A Methodology of Strategy Deployment**

Yaoguang Hu[1], Peng Su[1], Ruijun Zhang[2]
[1]*Beijing Institute of Technology, China*
[2]*Renmin University, China*

According to the problem that existing in Chinese typical enterprise group such as lacking of efficient strategy transition and difficulty of transforming strategy into operation actions, a new methodology of strategy deployment is proposed which takes critical success factor, key strategy performance index and action plan into consideration. In the proposed methodology, a new tool named House of Strategy (HOS) is given to realize strategy transformation based on Quality Function Deployment (QFD) approach. Finally, a software prototype system is developed and a case study is presented to illustrate the application of the methodology.

**Conception Design and Empirical Research of Multinational Subsidiary's Entrepreneurial Orientation**

Hui Zhang[1]
[1]*Hangzhou Dianzi University, China*

In the research field of corporate entrepreneurship (CE) and internationalization, the research of multinational subsidiary's entrepreneurial orientation (EO) is a new emerging topic. Although scholars have known importance of subsidiary's EO, but correlative theoretical and empirical research was scarce. There aren't still special conception design and dimension partition about multinational subsidiary's EO. The thesis divides EO of multinational subsidiary into three dimensions according to special behavior of firm: new business venturing, product/technology innovation and strategic renewal. And the thesis uses exploratory and confirmatory factor analysis to validate the conception design. The model embodies meaning of CE and background of multinational, proves multi-dimension of subsidiary's EO, and enriches the research of multinational subsidiary and CE.

**Synergetic Mechanism between Firm's Technological Learning Mode and Technological Capability Evolution: A Case Study**

Ru-yan Hong[1]
[1]*Zhejiang University, China*

For the local firms in latecomer countries, synergy between technological learning and technological capability can help firms to seize new technological opportunities and promote independent innovation. According to the evolution rule of lifecycle of technological system and degree of technological learning from the lowest to the highest, this paper firstly divides firm's technology learning mode of the local firms into three phases including passive reactivity learning, expansibility learning and creativity learning. Accordingly, technological capability is being developed in three phases, including technological introduction and imitation, technological absorption and independent innovation. With the case analysis of the technological capability evolution of Geely Automobile Holdings Ltd., we further discuss the synergetic mechanism between firm's technological learning mode and technological capability evolution from both static and dynamic views.

**Outward Foreign Direct Investment Strategy and Technological Capabilities Accumulation: A Case Study**

Xiaobo Wu[1], Wanling Ding[1], Yongjiang Shi[2]
[1]*Zhejiang University, China*
[2]*University of Cambridge, United Kingdom*

A number of developing-country firms made headlines when they invest abroad recently. Such headlines increased the interest of researchers in outward foreign direct investment (FDI) from developing countries. This paper focused on the relationship between developing-country firms' outward FDI strategy and their technological capabilities accumulation. This relationship was examined through a case study of a Chinese automotive components manufacturer. This study found out that outward FDI strategy has positive effects on developing-country firms' technological capabilities accumulation. And these effects were positively associated with firm's absorptive capacity.

**New Methodologies to Measure Product Technological Complexity for Manufacturing Optimization**

Barbara Cimatti[1], Giovanni Tani[1]
[1]*University of Bologna, Italy*

An effective technological complexity measure is sought to support designers and production managers activities. Different methods have been proposed but it still doesn't exist an universally recognized one. Once a technological complexity index is defined, it can be possible to check the product feasibility in relation to the available manufacturing technologies and to optimize design and production operations. In case of an international network production, where the selection of "the right plant for the right product" is a strategic point, this index is particularly useful.
Interviews are an effective method to evaluate complexity. In the present work a new original questionnaire is proposed as a tool to define a technological complexity index. Interviews to production operators concerning some mechanical components have allowed to calculate their technological complexity indexes. Results obtained through the questionnaire have been compared with the ones derived from a completely different methodology (heuristic equation) obtaining high convergence.

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| **Session** | Operations Research 4 |
| **Date** | 12/10/2009 |
| **Time** | 11:00 - 12:30 |
| **Room** | Montparnasse I |
| **Chairs** | Szu Hui Ng, Joaquin Sicilia-Rodriguez |

**Customers Fuzzy Clustering and Catalog Segmentation In Customer Relationship Management**

Mehdi fathi[1], Kamran kianfar[2], Amir hasanzadeh[3], Amir Sadeghi[4]
[1]*Iran University of Science and Technology, Iran*
[2]*Isfahan University of Technology, Iran*
[3]*AmirKabir University of Technology, Iran*
[4]*Tehran Payamenoor University, Iran*

This work is concerned with the fuzzy clustering problem of different products in k variant catalogs, each of size r products that maximize customer satisfaction level in customer relationship management (CRM). The satisfaction degree of each customer is defined as a function of his/her needed product number that exists in catalog and also his/her priority. For determining the priority level of each customer, firstly customers are divided to three clusters with high, medium and low importance based on his/her needed products list. Then all customers have been ranked based on their membership level in each of the above three clusters. In this paper in order to cluster customers, fuzzy c-means algorithm is applied. The proposed problem is firstly modeled as a bi-objective mathematical programming model. The objective functions of the model are to maximize the number of covered customers and overall satisfaction level results of delivering service. Then this model is changed to a single integer linear programming model by applying fuzzy theory concepts. Finally, efficiency of proposed solution procedure is verified by using a numerical example.

**A Variable Neighborhood Search Algorithm for Scheduling the Hot Rolling Operations at a Steel Mill**

Kenneth Sörensen[1], Dirk Cattrysse[2]
[1]*Universiteit Antwerpen, Belgium*
[2]*Katholieke Universiteit Leuven, Belgium*

One of the most important operations to occur in a steel mill is the hot rolling, a process which transforms steel slabs into much longer and much thinner coils. Selecting which slabs to roll and in which order is a problem that needs to be solved efficiently taking into account both technical and commercial parameters. In this paper, we develop an algorithm that uses several different neighbourhood search operators to robustly find high-quality solutions in a short computation time, even for large real-life problems. Some preliminary tests on artificially generated instances show that the algorithm performs satisfactorily.

**A Systematic Heuristic Rules Analysis Methodology for Routing Problems**

Diego Crespo Pereira[1], David del Río Vilas[1], Juan Luis Crespo Mariño[1], Alejandro García del Valle[1]
[1]*University of A Coruña, Spain*

Heuristic constructive algorithms have been widely and successfully applied to the solution of routing problems. Since they generally consist of an iterative insertion of nodes to construction routes, prioritization rules for assignments is critic for algorithm's performance. Developing these rules is time consuming and relies much on researcher skills and knowledge on problem features. This paper proposes a systematic methodology for a widespread exploration of prioritization rules aiming at reducing human effort on its development. A general model for prioritization is achieved by means of an artificial neural network. Parameters are tuned for the specific problem by an evolutionary strategy search. The methodology is formulated for generic routing problems and applied to VRPTW to illustrate its operation and as a preliminary test of its capabilities. Neural networks are evolved for Solomon's benchmark instances and analyzed to gain knowledge on underlying rules.

**Approximation Method for Performance Analysis of Three-Loop Closed Systems**

Na Li[1], Zhibin Jiang[1], Jianwei Niu[2], Caihua Zhuang[1]
[1]*Shanghai Jiaotong University, China*
[2]*University of Science and Technology Beijing, China*

This paper proposes an effective and accurate approximative analytical decomposition method for evaluating the throughput rate of a three-loop closed manufacturing system with unreliable machines and finite buffers. The main philosophy is to decompose the three-loop closed production line into three single loop closed lines and approximate the influence of each other by modifying the parameters of machines. By means of experiments, the method shows fairly accuracy.

**Catalog Segmentation with the Objective of Satisfying Customer Requirements in Minimum Number of Catalog**

Kamran kianfar[1], Mehdi fathi[2], Amir hasanzadeh[3], Amir Sadeghi[4]
[1]*Isfahan University of Technology, Iran*
[2]*Iran University of Science and Technology, Iran*
[3]*AmirKabir University of Technology, Iran*
[4]*Tehran Payamenoor University, Iran*

This work is concerned with customer-oriented catalog segmentation that each catalog consists of specific number of products. In this problem, requirements of a specific ratio of customers should be satisfied. According to the definition, when a customer is satisfied that at least t required products exist in his/her catalog. The objective of this problem is to minimize the number of catalogs, regarding to minimum number of customers constraint that was comply. In this paper, we present a mixed-integer programming model for this clustering problem. This problem is NP-Hard in large scales and the optimum solution is almost impossible to reach. Hence, a solution procedure is developed based on genetic algorithm. Then, the results of computational experiments are reported, in which the GA solution is compared with exact solution of mixed-integer programming model.

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| **Session** | Service Innovation and Management 1 |
| **Date** | 12/10/2009 |
| **Time** | 13:30 - 15:00 |
| **Room** | Montparnasse I |
| **Chairs** | Xiang Zhang, Edwin K W Cheung |

**The Relationship Among Information Technology, Innovation and Firm Performance －An Empirical Study of Business Services in SMEs**

JrJung Lyu[1], Y. W. Yan[1], S. C. Li[1]
[1]*National Cheng Kung University, Taiwan*

In recent years, information technology (IT) and innovation were considered important for enhancing the performance and competitiveness. However, the relationship between IT, innovation and business performance has not been thoroughly discussed in the past ten years. Besides, small and medium-sized enterprises (SMEs) occupy the great proportion of the total number of enterprises in the world, and most of them are service firms. However, development of service industry is restricted due to the insufficient input of innovation. In order to understand the present innovative situation of business services and to analyze the relationship between the IT, innovation and business performance in the service industry, a conceptual model is developed in this study. Data for the empirical investigation originates from the SMEs of business service firms. The empirical results show that innovation is mediating the effect of IT on business performance.

**The Service Science Exploitation and Experimental Design on a City Level Innovation ： A Practice of Living Lab on Taipei City Intelligent Life Scheme**

Hung Chih Lai[1], Y. S. Kuan[2], K. K. Hu[3]
[1]*Shih Chien University, Taiwan*
[2]*National Taiwan University, Taiwan*
[3]*Chinese Management Association, Taiwan*

Since the Taipei City Government attempts to create an intelligent and ubiquitous city via delivering public application services to the citizens, the development of ICTs (information and communication technologies) bring some changes in shaping service model to a city, such as the innovation delivered from public and private sectors to the society with different collaborative networks. Thus, the new services development and commercialization have become a key issue in the next-generation applications of the ICTs to people's daily life.

This study attempts to conduct an empirical case study for the exploitation of business model and market trends of intelligent service system which building up upon convenient stores in Taipei. Since Intelligent Living Technology and Service (ILTS) industry are formed within the government to call for collaboration among the various departments and agencies as an industrial alliance, the construction, renovation, management or maintenance are handled in a public-private partnership (PPP) framework. The discussion with multi-stakeholders and users' patterns that provides different experience to those adopted private cooperation in city development to achieve the goal of intelligent life.

**Service Offering, Perceived Value and Value Driver in Semiconductor Foundry Industry: An Exploratory Study**

Chieh-min Chou[1]
[1]*Feng Chia University, Taiwan*

Semiconductor manufacturing service providers, or foundries, have been playing a more and more important role in the industrial value network. However, little research has focused on service content and value. Based on service-dominant logic thinking, this study identifies major service offerings by focus group research and conducts a large-scale survey to explore the value and value drivers perceived by customers. Research results reveal that perceived value and key value drivers are quite different among service offerings. Results also suggest that foundry companies tailor value propositions for customers in different region when designing their service-offering portfolio.

**Bibliometric Analysis of Service Science Research: Focus on Contribution from Asia**

Kay Chuan Tan[1], Atarod Goudarzlou[1], Ayon Chakrabarty[1]
[1]*National University of Singapore, Singapore*

The objective of the paper is to describe the contribution of articles by Asian authors in the top journals in service research. This was done by reviewing and evaluating the methodological approaches and the geographical affiliations of authors published in the selected journals. A sample of top journal in service research is selected based on previous literature. The review and evaluation considers all papers published in selected journals over a 14 year period from 1995 to 2008. The papers are categorized and the geographical affiliations are noted. The analysis revealed that Taiwan is the major contributor in service related articles followed by Singapore, Hong Kong, and South Korea. This is the first review and analysis of contribution from Asian institutions in top journals of service research. The study provides valuable insights into the nature of academic publishing by authors from Asian institutions in the burgeoning area of service science.

**Unbundled Network Elements: Global Experiences and Game Theoretical Analysis**

Rui Dai[1], Shoulian Tang[1]
[1]*Beijing University of Posts and Telecommunications, China*

On September 28th, 2008, MIIT released Urgent Notice on the Co-construction and Sharing of Telecommunications Infrastructure which referred to the policy of Unbundled Network Elements (UNE) and triggered a new exploration on UNE. This article introduced the unbundling policy and its implementation in the United States and Europe, and mainly analyzed strategies of the stakeholders by a modified Cournot duopoly model for the UNE price regulation. Based on the global experiences and game theoretical analysis, we suggest that: (1) the regulator should mandate the unbundling policy to foster competition in telecommunications market, so as to improve the social welfare; (2) the network elements should be subdivided first, and be treated differently. We suggest that new network elements should be exempted from the unbundling rules, and in underdeveloped areas, the regulator should promise the ILEC a higher profit margin and encourage them to lease out their facilities.

**Quality and Customer Satisfaction Spillovers in the Mobile Telecoms Industry**

Yi Ding[1], Kah-Hin Chai[1]
[1]*National University of Singapore, Singapore*

Customer needs are increasingly fulfilled by a seamless integration of products and services. Complexity grows for firms to understand customers since their perception of firm performance can be affected by either product manufacturers or service providers. Our study is attempting to identify possible spillover effects of quality and customer satisfaction between products and services. Potential moderators such as affective commitment and consumer knowledge will also be examined. Our discussion shows that firms working closely together in delivering solutions to customers need to consider the influence of their partner's product or service quality and satisfaction level as well. This may enhance understanding of customer satisfaction and loyalty of their own companies.

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| **Session** | Service Innovation and Management 2 |
| **Date** | 12/10/2009 |
| **Time** | 15:30 - 17:00 |
| **Room** | Montparnasse I |
| **Chairs** | Kay-Chuan Tan, Chen-Wo Kuo |

**Developing a Scale of E-Service Quality for Blog**
Yu-Lung Wu[1], Yu-Hui Tao[2], Pei-Chi Yang[1], Ching-Pu Li[1]
[1]*I-Shou University, Taiwan*
[2]*National University of Kaohsiung, Taiwan*

The blog search engine Technorati made a survey in November 2008 and the results showed that the index volume of Blogs was as high as 133 million. In view of the increasing number and influence of blogs, their quality assessment has become a topic worth stressing and exploring. In this study, both quantitative and qualitative methods are used to construct a multi-stage scale development procedure, and to check and disclose the factor structure for assessment of blog website service quality. This scale is a basis for blog website users to evaluate the website service and for platform operators to plan for future operation.

**Multiple BPEL Execution Engines Based on Fragmentation Approach and Application of Service Process Models**
Jing Bi[1], Zhiliang Zhu[1], Yushun Fan[2]
[1]*Northeastern University, China*
[2]*Tsinghua University, China*

To solve united process customization and collaboration problems of various organizations, service process models fragmentation approaches based multiple BPEL execution engines were proposed. Firstly, a whole consistent model is partitioned as several self-contained implementation sub-chips which are sent to a number of BPEL execution engines respectively based on the different organizations and roles. And based on high-level Petri net puts forward the horizontal fragmentation methodology. Further, this paper verifies correctness of model fragmentation. Then the distribution after fragmentation is also presented to improve the reliability and availability of BPEL execution engines. Finally, this paper illustrates with a business process instance of enterprise supply chain that the fragmentation of process implementation is adaptive to autonomy together with decentralization of services, and can improve the flexibility and interoperability of BPEL execution engines.

**Empirical Assessment of An Integrative Service Design Framework**
Qi Zhou[1], Kay Chuan Tan[1]
[1]*National University of Singapore, Singapore*

Building on previous service design theories, the authors propose an integrative framework for service design. Through an extensive literature review and qualitative fieldwork in eight Asian service organizations, the authors specify nine constructs with 62 measurement items. These are validated and refined using data from 28 survey respondents. The authors further explore the relationship among the constructs and discuss the theoretical and managerial implications.

**How Service Technology Innovation Impact Customer Acceptance of Automatic Transaction Machine**
James K. C. Chen[1], Sin-Yi Lin[1], C.W. Hsiao[1]
[1]*Asia University, Taiwan*

The information technology is rapid growing in e-era, service providers introduced the convenient Self-service technologies (SSTs).These new technologies can increase service efficiency and save cost mainly due to the fact that the customers can complete their check-in procedures by themselves. However, the introduction of SSTs was not widely utilized immediately. Therefore, the major challenge presented here for the service provider is to identify the technology attitude of the consumer usage of SSTs, has become an important topic. The purpose of this study is based on empirical methods of service innovation to build consumer SSTs acceptance model to explore the service innovation, technology readiness index (TRI) and technology anxiety (TA) to consumer attitudes.
This study use LISREL to verify the research framework for SSTs. The purpose effects service innovation of SSTs to technology acceptance attitude. The finding indicate that: respondents with higher levels of TRI use more SSTs that TRI is a better. Respondents with higher levels of TA use fewer SSTs that TA is a better.

**Research on the Planned Failure and Recovery in Airline Overbooking**
Xiang Zhang[1], Jun Chen[1], Jin Huang[1], Huimin Wang[1], Yunhai Wang[1], Guoxin Wang[1]
[1]*Beijing Institute of Technology, China*

The planned failure and recovery is largely overlooked in the traditional service recovery literature. The purpose of this study is to establish a process-by-outcome framework suitable to gain the understanding of the impacts of critical factors on customers' satisfaction in the planned failure. These are achieved by proposing a theoretical classification framework using the content analysis method based on the data collected in the Chinese aviation industry. As contributions, this study firstly defines the planned failure and distinguished the concept from the traditional service recovery. Secondly, this study presents a classification system of the critical incidents accounting for the recovery process, outcome and customer consequential behaviors. The proposed framework helps link the critical incidents of company to customer's satisfaction and the consequential behaviors of customer.

**Applying Multiple Linguistic PROMETHEE Method for Personnel Evaluation and Selection**
Chen-Tung Chen[1], Yuan-Chu Hwang[1], Wei-Zhan Hung[2]
[1]*National United University, Taiwan*
[2]*National Chi Nan University, Taiwan*

Personnel evaluation and selection is a very important activity for the enterprises. Different job needs different ability and the requirement of criteria which can measure ability is different. It needs a suitable and flexible method to evaluate the performance of each candidate according to different requirement of different job with respect to each criterion. In this paper, we use crisp value to express quantitative information and use 2-tuple linguistic valuable to express qualitative information. And then, linguistic PROMETHEE is used to calculate the outranking index of each candidate and determine the ranking order of candidates. According the outranking index of each candidate, the performance of each candidate can be expressed by 2-tuple linguistic valuable which has explicit meaning in management. Finally, an example is implemented to demonstrate the practicability of the proposed method.

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| **Session** | Quality Control and Management 4 |
| **Date** | 12/10/2009 |
| **Time** | 11:00 - 12:30 |
| **Room** | Montparnasse II |
| **Chairs** | Shari Mohd Yusof, Zhang Wu |

**A Product Platform Optimization Method Based on QFD**
Xinggang Luo[1], Jiafu Tang[1], C.K. Kwong[2]
[1]*Northeastern University, China*
[2]*The Hong Kong Polytechnic University, China*

Quality function deployment (QFD) is a popular approach to design products that satisfy customer needs. To minimize the total quality loss caused by commonality when establishing a product platform and better satisfy customer requirements, this paper presents a five-step QFD-based methodology to determine the optimal values for platform engineering characteristics (ECs) and non-platform ECs of the products within a product family. First, the optimal values of ECs for each individual product within a family are determined. Then, the platform ECs are identified according to the calculated sensitivity indices of the ECs, and the values of each platform EC are clustered. A mathematical model is developed to simultaneously optimize the values of the platform and the non-platform ECs. Finally, the ECs that the worst overall customer satisfaction loss can be avoided are selected as platform ECs. A case study is used to demonstrate the methodology.

**The Optimal Sample Sizes for the Xbar and CUSUM Charts**
Mei Yang[1]
[1]*Nanyang Technological University, Singapore*

This article studies the sample sizes of two most commonly used control charts, the xbar chart and the CUSUM chart. It takes the sampling cost (including the variable and fixed components) into consideration and uses a quadratic loss function as a performance measure. Some findings contrary to the common beliefs are acquired. It suggests that if nxbar = 4 and nCUSUM = 1, the xbar chart often outperforms the CUSUM chart. Furthermore, the overall performance of both charts can be improved by an optimization design using the quadratic loss function as the objective. The optimal sample size depends on the range of mean shift $\delta$ and the ratio between the fixed and variable sampling costs. For general cases ($0 < \delta \leq 4$), the best sample sizes are nxbar = 3 for the xbar chart and nCUSUM = 2 or 3 for the CUSUM chart.

**The Impact of Costs of Quality: A Simulation Approach**
Mohamed k. Omar[1], Sim Hock Kheng[2], Sharmeeni Murugan[1], Mohamad Razali[1]
[1]*Technical University Malaysia, Malaysia*
[2]*Multiumedia University, Malaysia*

In this research an analytical model developed by Son and Hsu to compute the cost of quality was improved to include the acceptance sampling costs associated with inspection of incoming materials. The modified model was then used to carry out comprehensive simulation work that investigated a set of quality control strategies practiced by the manufacturing community. The results indicate that measuring and understanding cost of quality is very important. Moreover, the results show that some of the quality control strategies have a significant impact on cost of quality.

**Tolerance Design for Six Sigma Based on Life Cycle**
Jianjun Wu[1], Y.Z Wang[2], J.J Shao[3], J.X Han[3]
[1]*Tongji University, China*
[2]*Jiangxi University of Science and Technoogy, China*
[3]*Beijing Sunlight Tech. Ltd, China*

This study aims to solve one of the difficult problems about Six Sigma critical techniques¬——that is how to design tolerance for Life Cycle Six Sigma(LCSS) based on concurrent quality engineering. The objective is to improve design quality and reduce cost in the up-front phase of the development cycle. Robust and optimizing methods on the basis of LCSS Methodology are used as the technical foundation of six sigma tolerance design. In this paper, concurrent parameter and tolerance design models are integrated into LCSS methodology to realize the objectives of product robust design and process robust design within life cycle process, in terms of high quality and lower life cycle cost.

**Combining the K-means and Decision Tree Methods to Promote Customer Value for the Automotive Maintenance Industry**
Yi-Hui Liang[1]
[1]*I-SHUO University, Taiwan*

Customer value refers to the potential contribution of customers to an enterprise during specific periods. When enterprises understand the value of customers, enterprises that understand customer value can provide customized service to different customers and thus achieve effective achieve effective customer relationship management. This study focuses on the current automotive maintenance industry in Taiwan and systematically combining K-means method and decision tree theory to analyze customer value and thus promote customer value. The analytical results in this study can provide a valuable reference with regard to customer relationship management for managers in the automotive maintenance industry.

**Improving Service Quality Using Performance Indexes**
Kee-Kuo Chen[1], Jaw-Shen Wang[2], Ching-Wu Chu[2], Rong-Her Chiu[2]
[1]*Yu Da University, Taiwan*
[2]*National Taiwan Ocean University, Taiwan*

The purpose of this article is to demonstrate a method that can identify service attributes to improving service quality using service performance index. In particular, the problems of multicollinearity and whether all relevant attributes are included in the index are considered in the partial least squares method, and a service improvement score to identifying the improving priorities for each service attribute is also devised in this paper. for illustrating the method, we give an example of constructing an index based on actual data surveyed from the customers of an international shipping company and highlight the procedures used to assess its quality.

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| **Session** | Quality Control and Management 5 |
| **Date** | 12/10/2009 |
| **Time** | 13:30 - 15:00 |
| **Room** | Montparnasse II |
| **Chairs** | Ali Siadat, Kee-Kuo Chen |

**Optimizing the Auto-brazing Process Quality via a Taguchi-neural Approach in Automotive Industry**

H.L. Lin[1], Chang-Pin Chou[2]
[1]*Army Academy R.O.C., Taiwan*
[2]*National Chiao Tung University, Taiwan*

Many parameters affect the quality of the auto-brazing process. It is not easy to obtain optimal parameters of this process. This paper applies an integrated approach using the Taguchi method and a neural network (NN) to optimize the lap joint quality of air conditioner parts. The proposed approach consists of two phases. First phase executes initial optimization via Taguchi method to construct a database for the NN. In second phase, we use a NN with the Levenberg-Marquardt back-propagation (LMBP) algorithm to provide the nonlinear relationship between factors and the response based on the experimental data. Then, a well-trained network model is applied to obtain the optimal factor settings. The experimental results showed that the tensile strength of specimens of the optimal parameters via the proposed approach is better than apply Taguchi method only.

**The Relationship Between Statistical Process Control Critical Success Factors and Performance: A Structural Equation Modeling Approach**

Jafri Mohd Rohani[1], Sha'ri Mohd Yusof[1], Ismail Mohamad[1]
[1]*Universiti Teknologi Malaysia, Malaysia*

The purpose of this paper is to explore the relationships between statistical process control (SPC) critical success factors (CSF) and performance. Empirical data were collected from 326 responses from Malaysian automotive related companies using survey research methodology. Using exploratory and confirmatory factor analysis, six empirically validated latent constructs of SPC critical success factors and three empirically validated quality and firm performance constructs were identified. The structural equation modeling techniques was employed to examine the relationship between these six SPC critical success factors and performance. The results show that that there is a positive relationship between these CSF and performance.

**Bayesian Fault Identification of Multistage Processes**

Yanting Li[1], Fugee Tsung[2], Lifeng Xi[1]
[1]*Shanghai Jiao Tong University, China*
[2]*Hong Kong University of Science and Technology, China*

Multistage process fault identification have received much attention recently. In this article, we focus on identifying faults in multistage processes that affect the process mean vector. The new method utilizes Bayesian theory and evaluates the posterior probability of each possible fault scenarios. The scenario associated with the largest posterior probability is identified as the faults. Numerical analysis proves that the new method has satisfactory diagnosis power and accuracy.

**Quality Control of Architectural Design Based on Uniform Technical Standards**

Fan Chen[1], Jun Chen[1], Shutian Li[1]
[1]*Zhejiang University, China*

The quality of architectural design mostly rested with the individual performance of architects in the past. Today, with the increasing development of technical level, the quality of a design project more than ever before entails the cooperation among different professions invovled and the teamwork of a professional team. The engineers and scholars, however, tend to disregard the errors in cross-professional communication and the unnecessary duplicate labor which cause problems for the quality of design. Based on the theory of Total Quality Management systems, the thesis suggests that a series of feasible technical standards be established within an institute of architectural design for quality control. Specifically, we adopt the PDCA cycle by dividing it into four stages: Planning of technical standards, Doing of technical standards, Checking of technical standards, and Acting of technical standards. Finally, this essay will make a conclusion and give some suggestions on technical standard-setting.

**Research on Assembly Quality Evaluation Based on Markov Chain**

Jiping Lu[1], Shui-yuan Tang[1], Yan Yan[1], Faping Zhang[1], I Butt Shahid[2]
[1]*Beijing Institute of Technology, China*
[2]*National University of Sciences and Technology, Pakistan*

Assembly processes involve a large number of operations and uncertain factors, which makes the random deviation of assembly quality. How to quantifiably evaluate the final assembly quality remains a question. This paper presents a new methodology to fulfill the task. Based on the analysis of the factors influencing assembly quality of missile cabin, assembly quality model is formulated to establish the relationship between the assembly status and quality loss. Then the transfer matrix of assembly process is built by the functions of quality loss for the missile cabin in terms of Markov chain. Finally, a case study of the assembly process of missile cabin has been used to support and validate the proposed model.

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| **Session** | Engineering Economy and Cost Analysis 1 |
| **Date** | 12/10/2009 |
| **Time** | 15:30 - 17:00 |
| **Room** | Montparnasse II |
| **Chairs** | Antonio C. Fernandes, Gyutai Kim |

**Parameter Estimation of Space-Time Model Using Genetic Algorithm**
Siana Halim[1], Indriati N. Bisono[1], D. Sunyoto[1], I. Gendo[1]
[1]*Petra Christian University, Indonesia*

The Space-Time Autoregressive Moving-Average (STARMA) model family is a statistical inductive model that can be used to describe space-time processes. However, parameter estimation of the model often is not easy to obtain analytically because of the hard computation or the unknown probability density function underlying the data. To ease the difficulty, an approach to estimate the parameter is proposed in this study, i.e. genetic algorithm (GA). The GA is performed through simulations of various combinations of selection and crossover parameter chromosomes. The estimation, then, was carried out by the help of freeware R. The performance of the GA in estimating parameter is measured in the sense of the minimum residual sum of squares and the Akaike Information Criterion.

**Feature-Based System for Cost Estimation in Production Networks**
Holger Duerr[1], Ngoc Anh Tran[1], Carsten Loeser[1]
[1]*Chemnitz University of Technology, Germany*

As customer demands become more and more individualised, also the process of providing estimates and tendering offers is becoming increasingly complicated. In the future, apart from technological feasibility, order placement will to a great extent depend on the bidder's ability to respond to individual customer requests. Automated pre-calculation of production times and costs is thus becoming more and more significant for the enterprises' profitability in terms of order placement within production networks.
This paper introduces a paradigm based on integrated feature modeling, which permits a pre-estimation of production costs at the proposal stage in an automated and almost real-time manner.

**A Comparative Study to Estimate Costs at Bombardier Aerospace Using Regression Analysis**
Timothy Muia[1], Adil Salam[1], Nadia Bhuiyan[1]
[1]*Concordia University, Canada*

The main purpose of this research is to develop a target cost model for the Main Landing Gear at Bombardier Aerospace which offers a cost understanding at the early conception stage. The study uses a comparative analysis between a linear and a non-linear parametric model in order to determine which estimation method will increase the credibility of the cost estimate. The reliability of the models will be validated by two different methodologies to determine which parameter(s) become significant and therefore will be used to determine the cost. These methodologies are the analysis of variance and path analysis. It was found that the non-linear regression analysis achieves a lower level of error when comparing it to the linear regression.

**Conformance Quality and Failure Costs in the Software Industry: An Empirical Analysis of Open Source Software**
Lars Karg[1], Michael Grottke[2], Arne Beckhaus[1]
[1]*SAP Research, Germany*
[2]*University of Erlangen-Nuremberg, Germany*

The quality cost concept is well known in production economics. Recently, it has received a lot of attention in the field of software engineering. However, empirical studies of the association between failure costs and conformance quality have only been conducted for closed source software projects, but not for open source projects. This paper addresses this research gap. On the one hand, our analysis revalidates findings from production economics. On the other hand, it extends the limited empirical knowledge in the software quality cost research domain.

**The Management Impact on Value Added – An Approximate Measure**
Antonio S. C. Fernandes[1]
[1]*Technical University of Lisbon, Portugal*

An organization is modeled such that its bare structure becomes explicit. Accordingly, it is written a production function where a management factor approximately reflects the organization structure effect on the produced value added. The management factor is calculated for several European countries manufacturing sectors and correlated with labor, knowledge and capital productivities. Firms' sizes and the importance of outsourcing are also related to the management factor.

**Determine the Preference Ordering of the Stocks Listed in KOSPI with TOPSIS**
Gyutai Kim[1], Sanghoon Cho[1], Suhee Jung[1]
[1]*University of Chosun, South Korea*

Recently, most of the stock markets all over the world have ever experienced the worst situation since the great depression of 1929. Some of the stock market indices have dropped down to the half of the indices achieved in October of 2007. For example, KOSPI once hit a little over 2,000 in October of 2007. However, it has been roaming around 1,200 ± 250. The phenomena have been happening at Shanghai Composite, Hang Seng, Strait Times, and so on. With this current situation of the stock market, we tried to figure out how to make the sound investment in stocks from a decision-making theorist perspective. To this end, we employed the TOPSIS for the purpose of discriminating the stocks and proposed the decision-making framework for picking up the best stock. Finally, we demonstrate how to apply it to the stocks listed in KOSPI.

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| **Session** | Supply Chain Management 4 |
| **Date** | 12/10/2009 |
| **Time** | 11:00 - 12:30 |
| **Room** | Montparnasse III |
| **Chairs** | Lu Chen, David Bennett |

**Factor Analysis for Raising TMS Application**
SunIl Oh[1], SungWoo Kang[1], Kwang Mo Yang[2], Kyung-Sik Kang[1]
[1]*Myongji university, South Korea*
[2]*Yuhan University, South Korea*

To preoccupy the market faster than competitors and satisfy consumers' needs, companies focus on making huge efforts for cost reduction, one of the most influential key to the management. In accordance with product types, methods and environments, the logistics cost take up a significant part in the total cost
Therefore, Transportation Management System(TMS), the transportation and delivery system based on a warehouse process establishment and information technology plays a primary role.
The purpose of this study is to discuss the importance of logistics in the manufacturing industry, present both strength and efficiency of TMS and analyze the relevant factors in order to emphasize the usage of TMS.

**Petri-Net Based Modeling for Supply Chain Management: An Overview**
Xiaoling Zhang[1], Qiang Lu[1], Teresa Wu[2]
[1]*Harbin Institute of Technology, China*
[2]*Arizona State University, United States*

Since supply chain networks are discrete event dynamic systems, Petri-net has been an effective tool for supply chain modeling. Current research on Petri-net based modeling focuses on supply chain design and integration, production planning, inventory control, logistics and distribution. This paper first gives an overview of recent research work in supply chain management involved in all the above areas based on Petri-net, and then proposes potential directions. These directions are (1) modeling with uncertainty elements, (2) modeling combined with case study, (3) extend the modeling methods, (4) modeling for 3D concurrent engineering, (5) combination of Petri nets and System Dynamics, and (6) coordination of material and information flow.

**Assessing Supply and Demand Chain Leagility According to Hooke's Law for a Single-agent Scenario**
Egon Mueller[1], N. Nikoghosyan[2], Andreas Rutsch[2], Christian-Andreas Schumann[2]
[1]*Chemnitz University of Technology, Germany*
[2]*University of Applied Sciences Zwickau, Germany*

This paper supposes and presents an approach for evaluating the degree of leagility of supply and demand chains. Therefore the authors are modeling the supply and demand chain, using the cognitions and outcomes of Robert Hooke's law of elasticity, upon the similarities between springs and supply or demand chain echelons, basically founded on the mutual ability to connect, to adapt, to smooth, and to deflate things in order to transmit something of value. The model stated for a single-agent purpose can also be used in multi-agent scenarios. Upon creating a general leagility model the relationship between echelons on the below and the interferences between distinct agents on the above level could be visualized, obtaining a better understanding of the complete supply or demand chain/value chain system.

**A Three Level Multi-Period Multi-Location and Multi-Crop Sustainable Supply Chain Model**
Patricia Quadra[1], Justine Rodriguez[1], Marie Christianne Terol[1], Dennis Cruz[1]
[1]*De La Salle University, Philippines*

Agriculture worldwide has come to use increasing amounts of chemical pesticides and synthetic fertilizers and methods that are not sustainable which results to unbalanced crop rotation, pollution of crops and plants' impaired ability to absorb nutrients, thus lowering yield. Thus, a three level multi period, multi-location and multi-crop sustainable supply chain model is formulated comprising of the resource, production and distribution level. The objective is to minimize the total cost of the system. The model was solved using General Algebraic Mathematical Model (GAMS).

**Feed Logistics Management for a Vertically Integrated Swine Company**
Suphakan Homkhampad[1], K Piewthongngam[1], S Pathumnakul[1]
[1]*Khon Kaen University, Thailand*

In this paper, the logistic problem from an animal feed industry to a cluster of pig farms is studied. In the swine production, the feed demand is dynamic and uncertain. Pigs in different growth stage require different feed types. Also, the feed quantity required in each growth stage is also varied depending on the animal health and environment conditions. Likewise, a planer needs to consider other constraints such as the full truckload, the minimum ordering batch of a feed mill. Taking these factors into account, the feed logistic problem is complicated. To solve this problem, the collaborative between farms, delivery trucks and feed industry is necessary. The production lot size of feed industry, the order quantity of each farm in the cluster and the transportation plan must be integrated. In this paper, an algorithm based on the mathematical model is developed. The objective function of the model is to minimize the logistic cost which is the combination of transportation and inventory costs. The developed model has been tested with a practical sample from a large swine industry in Thailand. The result showed that the method provides a practical solution which could be applied to the industry.

**The Influences of Fuzzy Demand Forecast on Bullwhip Effect in a Serial Supply Chain**
Ying Xie[1]
[1]*University of Greenwich, United Kingdom*

Supply chains (SCs) operate in environments where there are various sources of uncertainties. This paper studies influences of fuzzy demand forecast on SC bullwhip effect. A two-echelon serial SC is considered and consists of production and inventory units. Uncertain customer demand and demand forecasted by the in-process facilities in the SC are described by imprecise linguistic expressions and modelled by fuzzy sets. Accuracy of demand forecast is measured via the level of uncertainty in demand. It is shown how fuzzy demand forecast affects the bullwhip effect in the SC, i.e., the sharper the fuzzy demand forecast, the smaller the bullwhip effect.

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| **Session** | Supply Chain Management 5 |
| **Date** | 12/10/2009 |
| **Time** | 13:30 - 15:00 |
| **Room** | Montparnasse III |
| **Chairs** | Andre Langevin, Susan Morton |

**Factors Causing the Termination of the Relationship with Suppliers**

Fethi Calisir[1], Cigdem Altin Gumussoy[1]
[1]*Istanbul Technical University, Turkey*

Over the past few years, firms have given more importance to the purchase-related decisions to gain competitive edge. Although great emphasis is given to the selection process of suppliers, commercial partnership may be terminated at a future date. This study, based on data from 66 automotive firms, examines factors affecting buyers' decision on the termination of the relationship with suppliers in the automotive industry. The results indicate that buyers rate 'supplier's disinterest' as the most influential construct of problems, and among the 25 individual problems, 'supplier firm does not make product deliveries in agreed time' is rated as the most influential problem to end commercial partnership. In addition, 'competitive firm's attraction level' is the only determinant of the probability of working again with the former supplier at a future date. Implications of these findings are discussed and further research opportunities described.

**Strategic Logistics Outsourcing: An Integrated QFD and AHP Approach**

William Ho[1], David Bennett[1], KL Mak[2], Bing Chuah[3], Carman Ka Man Lee[4], Matthew Hall[1]
[1]*Aston University, United Kingdom*
[2]*The University of Hong Kong, Hong Kong*
[3]*City Univeristy of Hong Kong, Hong Kong*
[4]*Nanyang Technological University, Singapore*

Third-party logistics service providers (3PLs) play a vital role in contemporary supply chain management. Evaluation and selection of the right 3PLs depends on a wide range of quantitative and qualitative criteria rather than cost-based factors. Although various multi-criteria decision making approaches have been proposed, they have not considered the impact of business objectives and requirements of company stakeholders on the evaluating criteria. To enable the "voice" of company stakeholders is considered, this paper develops an integrated approach for selecting 3PL strategically. In the approach, multiple evaluating criteria are derived from the requirements of company stakeholders using a series of house of quality (HOQ). The importance of evaluating criteria is prioritized with respect to the degree of achieving the stakeholder requirements using analytic hierarchy process (AHP). Based on the ranked criteria, alternative 3PLs are evaluated and compared with each other using AHP again to make an optimal selection.

**Optimal Repositioning and Purchasing Policies in Returnable Container Managament**

Afif Chandoul[1], Van-Dat Cung[1], Fabien Mangione[1]
[1]*Grenoble INP, France, Metropolitan*

This work focuses on the optimization of the returnable container management problem in a global and sustainable supply chain context. The problem consists in: (1) choosing the best way to reposition empty containers between several sites for next rounds of use and (2) purchasing the right quantity of new containers at the right period to meet system requirements for product transportation. For this problem a linear integer program model is proposed. Based on some partial network flow properties (section IV.C), a decomposition into two independent models, purchasing and transportation, has been developed to determine an optimal policy. The benefits of this decomposition, on the technical and industrial level, will be presented and discussed.

**Identifying Vulnerabilities in the Supply Chain**

Ana Paula Barroso[1], Virgínia Machado[1], Virgilio Cruz-Machado[1]
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The supply chains environment is changing, and organizations are facing pressures, which means that vulnerability to disturbances is increasing. In this context, it is crucial for supply chain (SC) survival that managers identify the vulnerability of SCs to disturbance in a proactive manner. A fundamental prerequisite for identifying SC vulnerabilities is an understanding of the network that connects a business to its suppliers and to its customers. Therefore, to achieve this objective, SC mapping needs to be performed. After that, it will be possible to identify the vulnerability of the SC to disturbances, and to define strategic or operational policies to reduce the effects of these disturbances on the SC. The main purpose of this paper is to show that the mapping of the SC allows identify the specific vulnerabilities of a SC to disturbances. An illustrative case study is developed. The mapping process is performed using Value Stream Mapping.

**Design and Development of a Knowledge Discovery System in Inventory Management**

Catalin Mitrea[1], Carman Ka Man Lee[1]
[1]*Nanyang Technological University, Singapore*

To manage the inventory efficiently, it is necessary to have accurate forecasting. To extract and deploy the knowledge associated with forecasting attracts the attention of both academic and practitioners. Knowledge is regarded as a valuable asset for enterprises and it can be manipulated through intelligence techniques like Artificial Neural Networks (ANN). ANN has the special ability to learn facts about one knowledge domain by inputting data obtained from observations. This study focuses on exploring how ANN learns and analyzes different types of ANN and ANN architectures used in the demand forecasting. The feasibility of the proposed approach to the demand forecasting issue is demonstrated with numeric data. The significance of this study is to adopt ANN as a knowledge discovery system thereby enhancing the inventory management.

**Using Compromised Method in Design of Reverse Logistics Network With Eco-Efficiency Consideration**

Mehdi fathi[1], Amir hasanzadeh[2], Abbas Raad[2], Farzad Dehghanian[2], Saeed Mansour[2]
[1]*Iran University of Science and Technology, Iran*
[2]*AmirKabir University of Technology, Iran*

Increasing importance of sustainable development has lead eco-efficiency to find a specific position in literature. Eco-efficiency means producing goods and delivering services by using lower energy and raw material which together result in lower amount of wastes, pollution and cost. Eco-efficiency considers two aspects: economical and environmental. The purpose of this article is to design reverse logistics network whose eco-efficiency satisfies the opinion of decision maker. So a bi-objective linear programming model (minimizing cost and environmental effects) is developed and efficient points of model are found. In the following, using interactive method of STEM that considers trade-offs between economic and environmental objectives in interaction to decision maker, an efficient recovery network is presented.

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| **Session** | Supply Chain Management 6 |
| **Date** | 12/10/2009 |
| **Time** | 15:30 - 17:00 |
| **Room** | Montparnasse III |
| **Chairs** | Nunzia Carbonara, Ana Paula Barroso |

**New Tactics for Sharing Demand-Related Information to Implement Individual Demand Forecasting**
Zhongjun Tang[1], Jing Xiao[1]
[1]*Central South University, China*

Individual demand forecasting is one strategy to address customization-responsiveness squeeze. One essential condition to implement individual demand forecasting is to share demand-related information. After analyzing the necessity of sharing demand-related information under customization-responsiveness squeeze and establishing a model for demand generation process, three new tactics for demand-related information sharing are proposed, including their ideas, benefits and their applicable domain, because existing tactics are not applicable to address the customization-responsiveness squeeze. Comparisons among new tactics and existing tactics are made. The new tactics can be illustrated by examining experiences of Dell Computer.

**The Role of Information Technology and Supply Chain Integration on Production Cost Performance**
Sakun Boon-itt[1]
[1]*Thammasat Business School, Thammasat University, Thailand*

The objective of this paper is to increase the understanding of supply chain integration implementation through a selection of information technology (IT). Survey response from production/purchasing managers in 141 of Thai automotive industry are analyzed to test the effect of types of information technology and supply chain integration on production cost performance. Analysis of Variance (ANOVA) was used to analyze the data. The results suggest an interaction effect of collaboration/decision support information technology to enhance the effectiveness of supply and customer integration. The results from this study provide a framework linking supply chain integration strategies and production cost, leading to valuable insights into how information technologies can be configured for enhancing production cost performance.

**A Genetic Algorithm Approach to Reducing the Bullwhip Effect by Investigating the Efficient and Responsive Strategy in Online Supply Chains**
Jianping Lu[1], Paul Humphreys[1], Ronan McIvor[1], Liam Maguire[1]
[1]*University of Ulster, United Kingdom*

This research presents an extension to the Genetic Algorithm approach to reducing the Bullwhip Effect by investigating the individual efficient or responsive strategy for each member in different online supply chains. Four types of supply chain structure by positioning the decoupling point will be investigated to determine if the Genetic Algorithm (GA) can help find optimal ordering policy and lead time for each member and, at the same time, reduce the impact of the Bullwhip Effect and total mean cost across the online supply chain. It is shown that the optimal supply chain structure that presents better performance on both the total lead time and the mean cost should be employed.

**A Closed-loop Supply Chain Planning Based on Adaptive Genetic Algorithm**
Zhengying Cai[1], Hanwei Fang[2], Renbin Xiao[2], Rong Xin[1]
[1]*Three Gorges University, China*
[2]*Huazhong University of Science and Technology, China*

A closed-loop supply chain operation integrating forward and reverse supplies, productions and distributions are established here based on the control engineering theory, and the status equations and mathematical model of supply chain planning and operation with existed uncertainties are analyzed also. To integrate the uncertain forward and reverse supply chain planning information, a fuzzy adaptive planning strategy based on genetic algorithm is designed, where the information of demand, purchasing, recovery, inventory and production is fuzzy. The program uses fuzzy adaptive genetic algorithm to optimize fuzzy rule table, so planning parameters can be changed with the supply chain operation and be self-adjusted according to fuzzy rules to improve the static and dynamic performance characteristics of the system. Finally, a closed-loop operation case is analyzed for authentication.

**A Resilient Strategy for Meat-food Supply Chain Network Design**
Yiping Jiang[1], Lindu Zhao[1], Shengnan sun[1]
[1]*Southeast University, China*

As more interdependent relationship between suppliers and their immediate buyers in current supply chain networks (SCNs), any disruption of SCNs can bring dramatic threatening to the entire networks. The purpose of this paper is to present a network-design tool that can be used by managers/decision-makers in managing the disruption risks to forge a resilient meat-food SCNs. In this paper, a resilient network-design model based on multi-supplier is constructed to enhance the survivability and resilience of the SCNs after the supply disruption happened by using mixed-integer stochastic programming method. Then benders decomposition algorithm is adopted to solve the proposed model. Finally, a case analysis is presented to highlight the significance of the proposed model and the efficiency of the developed survivable resilient SCNs for meat-food.

**A Systematical Approach to Improve Supply Chain: An Application of RFID Technology on Cargo Transportation**
ChungEn Kao[1], Pi-Chuan Hung[2]
[1]*Massachusetts Institute of Technology, United States*
[2]*Industrial Technology Research Institute, Taiwan*

This paper proposes a systematical approach to design a secure and efficient supply chain. A real international trading case of transporting cargos from an offshore bonded warehouse to a domestic one is used to demonstrate. Through supply chain architecture analysis, system boundaries, interfaces, and value related operands are defined. With system dynamics analysis, feedback and relations of actions to the goals are studied, and potential options are evaluated. Then a prototype of the selected option is implemented to gather further information for future improvement. The two elements, RFID and UCR, applied for improving supply chain, and how they work in the prototype are explained.

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| **Session** | Project Management 4 |
| **Date** | 12/10/2009 |
| **Time** | 11:00 - 12:30 |
| **Room** | Montparnasse IV |
| **Chairs** | Norbert Trautmann, Ofer Zwikael |

**Towards Process Change Impact Analysis in Industrial Engineering**
Stefan Häusler[1], Ralf Buschermöhle[1], Roland Koppe[1], Axel Hahn[2]
[1]*OFFIS - Institute for Information Technology, Germany*
[2]*University of Oldenburg, Germany*

Today, the development of large systems, is more and more based on new model driven design methods that try to overcome gaps between the engineering domains. These design methods are often allocated to the design phase to avoid deep process iterations. Their impact on the process outcome can be tremendous but is not well understood. Existing impact analysis methods frequently fail to provide the required flexibility and capability that are necessary to analyze the impact of design methods in terms of precision and efficiency. Therefore, new analysis methods and models that allow an appropriate impact estimation of such design methods on the product development process are required to provide an adequate information basis for profound management decisions.
This paper derives requirements from a use case for an impact analysis of new design methods in product development and investigates the gap between the existing state-of-the-art and the derived requirements.

**A Task Group Based Multi-order Critical Chain Identification Algorithm**
Qiong Liu[1], Na Liu[1], Saif Ullah[1]
[1]*Huazhong University of Science and Technology, China*

In order to improve on-time delivery of orders and reduce the delivery time of orders, the critical chain project management method is introduced to the order management in multi-variety and small batch order production companies and a critical chain based multi-order management method is yielded. To reduce the complexity of multi-order processing in each task node, a task group is used to simply the process of critical chain identification. A task group based critical chain identification algorithm for multi-order management is proposed. The proposed algorithm is verified in an air conditioner manufacturing company. The illustrative example shows that the proposed algorithm could help the company to rationalize resources allocation, to make reasonable guaranteed delivery time and to reduce the lead time.

**Using Sliding Frame Approach for Scheduling Large and Complex Projects**
Arik Sadeh[1], Yuval Cohen[2], Ofer Zwikael[3]
[1]*Holon Institute of Technology, Israel*
[2]*The Open University of Isarel, Israel*
[3]*The Australian National University, Australia*

There is a steadily increase in the size and complexity of projects. As a result, traditional project scheduling techniques, such as non-polynomial (NP) algorithms can no longer provide an optimal solution to minimum project duration under predecessors and resource constraints.. This paper presents for the first time a general new approach that allows utilizing such algorithms in heuristic manner. This approach could be efficiently applied for solving most project scheduling problems. The main advantage of this approach is its ability to dissect the original problem to small controllable size sub problems for which exact techniques can be applied. Thus, it neutralizes the complexity of the applied algorithms (and their non-polynomial growth). We discuss our experience applying this approach and give some insight as to the choice of parameters of the sliding frame.

**Ant Colony Algorithm for the Partner Selection Problem in a Complex Product System Project**
Yongyi Shou[1], Chunjiang Song[1]
[1]*Zhejiang University, China*

Partner selection is critical for the success of a complex product system (CoPS) project. The factors influencing partner selection are summarized and quantified, and a multi-objective integer programming model is proposed to formulate the decision making process of partner selection. The objective is to reduce the risk of project failure and to minimize the overall project cost and the tardiness penalty. An optimal combination of partners could be found for all sub-projects. An ant colony algorithm is proposed to solve the partner selection model. The numeric test results showed that the proposed model, together with its ant colony algorithm, is effective in selecting partners for CoPS projects.

**Managing Resource and Technology Interdependencies in Project Portfolio: A Case-Study Results**
Mait Rungi[1]
[1]*Lappeenranta University of Technology, Finland*

In multi-project management, projects can not be taken in isolated way. They have often interdependencies with each-other, such as sharing human resources and modularized structure, and knowledge diffusion. Managing these relationships in portfolio selection and review process helps to make more effective selection choices and increase projects success rate in project portfolio management. There are many methods available to support interdependency management, but recent empirical findings showed that not many of them are used in practice. In the present research, a multiple case study has been performed to find out how interdependencies are managed in real life. The results show that interdependencies are mostly managed by informal ways. A description of managing interdependencies is given.

**Research Frame for Incentive Mechanism of the Construction Agent in Government Investment Project: From the Perspective of Project Governance**
Ling Yan[1], Linggang Yang[1], Hua Zhao[1]
[1]*Tianjin University of Technology, China*

With project management model reformation in government investment project (GIP), the implementation of the agent construction system (ACS) improved project management performance of GIP in China. It is a crucial issue that incentive mechanism study for the Agent influences further reformation and implementation of the ACS, but the researches above are scattered, and most of them are based on principal-agent theory, which caused the paradox of incentive mechanism for the Agent. The paradox would be solved better by introducing project governance (PG) theory. This paper integrates various incentive mechanisms on institutional level into the theory frame of PG, and forwards an overall theory frame of incentive mechanism for the Agent. The frame contains internal and external incentive mechanisms: the former includes the risk allocation (RA) mechanism and the rewards mechanism based on RA; the latter includes project management performance evaluation mechanism and reputation mechanism.

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| **Session** | Information Processing and Engineering 1 |
| **Date** | 12/10/2009 |
| **Time** | 13:30 - 15:00 |
| **Room** | Montparnasse IV |
| **Chairs** | Gary Chen, Zhongjun Tang |

**Cost Estimation of Automotive Sheet Metal Components using Knowledge–Based Engineering and Case–Based Reasoning**
Sachin Karadgi[1], Ulf Müller[1], Daniel Metz[1], Walter Schäfer[1], Manfred Grauer[1]
[1]*Universität Siegen, Germany*

Responding quickly to a customer's request with a sufficiently precise offer is one of the challenges faced by almost every manufacturing enterprise. Currently, necessary information is passed from department to department and in many cases this information is waiting to be processed. Further, number of offers that are converted into orders is small making the process of preparing an offer relatively costly. Research has been carried out to automatically determine process plans and estimate cost of simple sheet metal components. Unfortunately, this research has not been extended to simultaneously determine process plan and cost of complex deep drawn components. To overcome these drawbacks and to substantially improve the efficiency and precision of the time consuming process of offer preparation, a new methodology is presented which utilizes knowledge-based engineering and case-based reasoning. Inputs obtained to create an offer can be used to generate basic tool structure for the downstream processes.

**Semantic Association Search and Rank Method Based on Spreading Activation for the Semantic Web**
Myungjin Lee[1], Wooju Kim[1]
[1]*University of Yonsei, South Korea*

As the information on the web dramatically increases, the existing web reveals more and more limitations in information search because web pages are designed only for human consumption by mixing content with presentation. In order to improve this situation, the Semantic Web based on ontology comes on the stage by W3C, and it will bring a significant advancement in web search. To do this, the Semantic Web must provide different search methods based on relationships between resources. In this paper, we propose a semantic association search methodology that consists of how to find relevant information for a given user's query in the ontology, that is, a semantic network of resources and properties. From this work, users can search the semantically associated resources with their query as valuable and important information.

**An Approach for Module Decomposition Based on Fuzzy Pattern Recognition**
Yanqiu Xiao[1], Guofu Luo[2], Jun Ma[2], Li Hao[2], Houfang Sun[1]
[1]*Beijing Institute of Technology, China*
[2]*Zhengzhou University of Light Industry, China*

Modular layout is the basis of modular design for complex product that makes up of multi-domain systems. Furthermore, module decomposition is the precondition for the layout. So the way of information expression, processing and system dividing becomes critical. In this paper, a methodology based on fuzzy pattern recognition is proposed to resolve the module decomposition problem. Firstly, the correlative information among elements is given in the form of constraint network model. In this way, correlative information of product is organized into a tri-view model, the functional, the structural and the behavioral. Secondly, fuzzy pattern models for the functional and the structural are obtained by transforming correlative information into pattern vector. Meanwhile, the ideal patterns for both of them are suggested according to the objectives of planning. Then, fuzzy distance between random pattern and the ideal is passed to GA to evaluate and optimize the layout until the appropriate one. After that, consistent multi-view is built up through correlation among the three views. Finally, a case study about engine is presented to illustrate the application of the proposed approach.

**Checking Multi-agent Schedules with Temporal and Causal Information**
Shieu-Hong Lin[1]
[1]*Biola University, United States*

Time management in a distributed multi-agent environment requires agents to progressively collaborate and negotiate before reaching a final feasible schedule of future events. In this process, it is important for individual agents to check whether a prototype schedule can meet their requirements and are free from undesirable effects in all possible event sequences. We present a modelling framework for encoding events with causal and temporal information. We show that the schedule validation task under this framework is NP-complete when the uncertainty in event ordering is very high. We develop a search algorithm for reasoning about possible consequences over a given set of events and show that the algorithm can effectively improve the computation efficiency by exploiting event-chain structure embedded in the time-interval information, which ends in tractable polynomial-time performance for events with moderate uncertainty in event ordering.

**Exploration and Verification of Factors in the Front-end Stage of the ERP Implementation Process: Evidence from Case Study and Survey Research**
Kun Shi[1], Qiang Lu[1]
[1]*Harbin Institute of Technology, China*

ERP (Enterprise Resources Planning) is widely used to improve business performance. This paper explores how the factors associated with the Front-end ERP Implementation Process (FEIP) affect the implementation outcome. First, based on literature review, a preliminary framework with 12 hypotheses is developed. Then Grounded Theory is applied for a case study to further extract and verify the factors and sub-factors. These factors are finally identified as strategic planning, corporate culture, user characteristics, organization-process-system maturity, external expertise engagement/support, and project preparation. Furthermore, the significance and correlation of all the factors are detected by conducting survey research with SPSS as a tool for analysis. The study shows that the framework is valid, and that among six, three factors have strong impact on the ERP implementation result, whereas others are less influential. Implication is given and limitation is indicated at the end.

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| **Session** | Information Processing and Engineering 2 |
| **Date** | 12/10/2009 |
| **Time** | 15:30 - 17:00 |
| **Room** | Montparnasse IV |
| **Chairs** | Shieu-Hong Lin, Maria Grazia Gnoni |

**A New Method for Temperature Prediction and the TAIFEX Forecasting Based on Fuzzy Logical Relationship and Double Interval Division**

Mohammad Hossein Fazel Zarandi[1], Ali Molla Davoudi[1], Maryam Haji Ali Beigi[1]
[1]*Amirkabir University of Technology(Tehran Polytechnic), Iran*

This paper proposes a new method in time series forecasting for the daily temperature data set and the TAIFEX series (1996), with a novel approach in interval setting and model fuzzification. This model utilizes intervals with overlap which assigns each one of the individual entity of the set a weighted fuzzy counterpart. Fuzzified corresponding to each datum is a linear combination of two successive linguistic variables. The weights in the linear combination are degrees of memberships by which the datum belongs to two successive fuzzy sets. The second degree is the complement of the first one and vice versa. Fuzzy Logical Relation (FLR) is used to cluster the set and the mean method to defuzzification.

**Recommendation for Custom Product Via Probabilistic Relevance Model**

Yue Wang[1], Mitchell Tseng[1]
[1]*Hong Kong University of Science and Technology, Hong Kong*

Product recommendation system has been widely used in industry especially for e-Commerce companies to solve the problem of information overload. Nonetheless, information overload is also a severe issue in custom product development practice. Sometimes customers can easily get overwhelmed by the vast number of product varieties and it is hard for them to make choices. However, the established product recommendation approaches are primarily for off-the-shelf products, adaptation for custom products has been difficult due to the different scenarios of custom product design. In this paper, a new recommendation method for custom product design is proposed based on probabilistic relevance model. The idea is to calculate the probability that each product meets an active customer's specifications based on partial product specifications given by the customer. Then the recommendation is presented according to the ranking of probabilities of relevance. Experiments are carried out and the result shows that the presented approach can improve the recommendation efficiency significantly comparing with random recommendation.

**Proposition of Two Multiple Criteria Models Applied to Dynamic Multi-objective Facility Layout Problem Based On Ant Colony Optimization**

Gary Chen[1], Jamie Rogers[2]
[1]*Chung Yuan Christian University, Taiwan*
[2]*University of Texas at Arlington, United States*

Dynamic Facility Layout Problem (DFLP) has garnered much attention lately. At the current time, researches in this area are mainly on the distance-based objective or quantitative aspect of DFLP. Focusing on the quantitative objective alone is not adequate to reflect situations in the real world—a little consideration is given to the quality aspect of facility layout such as the adjacency of facilities. This paper proposes two multiple criteria models for solving facilities layout problems—MUGHAL proposed by Dutta and Sahu and Urban's Additive Model—by incorporating them into the meta-heuristic framework of Ant Colony Optimization (ACO) for solving a newly proposed problem of Dynamic Multi-objective Facility Layout.

**Measuring Customer Innovativeness via FuzzyART Network Modeling**

Yung-Hsin Chen[1], Shuo-Chang Tsai[1], Sheng-Tsung Hou[2], Long-Tai Chen[3]
[1]*Asia University, Taiwan*
[2]*Feng Chia University, Taiwan*
[3]*Industrial Technology Research Institute, Taiwan*

Many attempts to bridge innovation and creating market opportunity fail due to a company's incompetence to cross the chasm—the diffusion transition between the embryonic market where customers are innovators/early adopters and the profitable mass market where customers are early majority/later majority. However, the extant body of literature address the why but not the how. This paper thus presents the research method incorporating the approach of customer knowledge management (CKM) to shed light on how to tackle the challenge. The process of CKM not only but delineates the executable procedure how to gain an insight into customer response to an innovative product, also employs several quantitative methods as the benchmarking tools for the peer-to-peer evaluation in a multiple-assessment scheme. It does so to justify the effectiveness of a less-used unsupervised clustering tool, the FuzzyART network model, against other conventional methods. In addition, the exercise of the CKM process in an industrial level case study further confirms its potential as an approach of novelty in the context of marketing the innovative products and services.

**Does Customer Satisfaction Affect the Quality, Trust – Loyalty Links in the Marketing Channel Context? – An Empirical Study on Taiwan Hypermarket**

Yung-Hsin Chen[1], Shuo-Chang Tsai[1], Ya-Wen Yu[1], Ying-Ying Wang[2], Sheng-Hsiung Hsu[1]
[1]*Asia University, Taiwan*
[2]*National Yunlin University of Science and Technology, Taiwan*

Marketing channel as the downstream end of a supply chain plays a crucial role in generating cash flow and meeting the demands of customers. The extant body of literature postulates that antecedent-consequence links that customer perceived value and service quality foster customer loyalty, leading to long term profitability. Nowadays, given the proliferation of global hypermarket organizations and their adapting retail positioning strategy, it is worthwhile to re-examine the validity of those postulations. This study conducts an empirical study on the customer perception of quality of product/service toward a multinational chained hypermarket store in Taiwan. The objective is to test the established theory in the domain of SCM by constructing the hypotheses based on the extant literature and allowing a structure equation modeling (SEM) for path analysis. The contingency theory in organization behavior explains the findings that are seemingly contradictory to the well-accepted paradigms. The outcome provides an insight into how hypermarket retailers should make improvement in customer satisfaction to reinforce customer loyalty while executing the 'low-price, low-service' marketing strategy.

**Prioritizing Risks Based on Multicriteria Decision Aid Methodology: Development of Methods Applied to ALSTOM Power**

Mafalda Figueiredo[1], Monica Oliveira[2]
[1]*Alstom Power, Switzerland*
[2]*Technical University of Lisbon, Portugal*

Similar to other multinational companies, ALSTOM (Switzerland) has been using a methodology based on the Probability Impact Diagram (PID) to prioritize risks. Nevertheless, available studies indicate that this approach might generate inconsistencies in ranking risks. This study proposes an alternative risk-rating model based on a multiple-criteria decision aid methodology denominated Measuring Attractiveness by a Categorical Based Evaluation Technique (MACBETH). The proposed method is applied to the construction phase of Power Plant projects at ALSTOM, and the MACBETH methodology is then compared with the PID methodology in terms of process, method and tool compatibility. Analysis shows the adequacy of the multiple-criteria methodology to prioritize risks.

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| **Session** | Decision Analysis and Methods 2 |
| **Date** | 12/10/2009 |
| **Time** | 11:00 - 12:30 |
| **Room** | Montparnasse V |
| **Chairs** | Marc Wouters, Yu Cheng |

**Maximum Loadability Limit of Power Systems Using Different Particle Swarm Optimization Techniques**
Parimal Acharjee[1], A. Indira[1], Samit Mandal[1], S. S. Thakur[1]
[1]*National Institute of Technology, India*

The efficient method to assess the static voltage stability is maximum loadability limit (MLL). Loadability problem is formulated as an optimization problem considering both equality and inequality constraints. Three particle swarm optimization (PSO) techniques namely general PSO, Adaptive PSO (APSO) and Chaotic PSO (CPSO) are developed to obtain maximum loadability limit under voltage limits and reactive power generation limits. In APSO method, PSO-parameters are made adaptive with the problem and chaos is incorporated in CPSO method to obtain faster & reliable convergence. All methods are applied on standard IEEE 14 bus, 30 bus & 57 bus test systems to show their effectiveness & efficiencies.

**Snow Hydrology Studies in the Mountainous Eastern Part of Turkey**
Reşat Acar[1], Serkan Şenocak[1], Selim Şengül[1]
[1]*University of Atatürk, Turkey*

Snowmelt runoff in the mountainous eastern part of Turkey constitutes 60-70% in volume of the total yearly runoff during spring and early summer months. Forecasting the amount and timing of snowmelt runoff is an important task in order to use the water resources.
An evaluation of climate conditions is compared at 3 meteorological and snow stations, located in Erzurum Kırkgöze (Çipak) basin. The data obtained from the stations are integrated into daily average time series of wind, temperature, humidity, air pressure, soil temperature, solar radiation, precipitation, snow pressure and depth above the snow pillow.
Snowmelt runoff model is used in conjunction with remote sensing and geographic information systems to forecast the river discharges in the Kırkgöze Basin. It is shown that the sufficient and qualified climate data can be collected in a real time from 3 stations, having different aspects and altitudes, in a mountainous basin with high snow potential.

**A Simulation Study of Prototyping for Risk Reduction in Product Customization**
Songlin Chen[1], Youbang Zhang[1], Min Chen[1]
[1]*Nanyang Technological University, Singapore*

This paper develops a risk model that captures the inherent uncertainties concerning the value and cost of a customized product. Analysis based on the model reveals that risks may handicap potential transactions and consequently prevent customers and manufactures from tapping into the value of customization. Prototyping, as commonly used in product customization, is then interpreted as a means of risk reduction and modeled as a Bayesian estimation process. Numerical analysis based on simulation is conducted to investigate the investment decision upon prototyping with respect to the fidelity and cost of the prototype. This paper provides a decision framework for practitioners to understand and manage transaction risks in product customization.

**Method to Evaluate the Profitability and Risk Structure of Projects in the Automotive Industry**
Max von Bredow[1], Gunther Reinhart[1]
[1]*Technische Universität München, Germany*

As automotive companies are concentrating on their core competencies, the number and importance of buyer-supplier-relationships is growing. Furthermore, projects in the automotive industry are characterized by runtimes up to ten or more years and the environment can be described as turbulent. Therefore, decisions of companies are subject to a decreasing predictability of future cost and risk factors concerning not only their own value creation, but also the collaboration with suppliers and buyers. Hence, today's evaluation of profitability by calculating one deterministic Net Present Value (NPV) for a single project is not sufficient. The paper describes a method, which allows the evaluation of projects profitability under detailed consideration of occurring costs and risks in the company-wide value creation process over the project runtime.

**Get a Grip on Sense-Making and Exploration: Dealing with Complexity through Serious Play**
Poul Kyvsgaard Hansen[1], Ade Mabogunje[2], Louise Moeller Haase[1]
[1]*Aalborg University, Denmark*
[2]*Stanford University, United States*

This paper focuses on the relationships between complex problems, sense-making, and exploration. We argue that we increasingly face complex problems for which we do not yet have effective coping methods. We further argue that, given the nature of these problems, it is useful to explore the role of play and games as effective coping methods. Through play we can make sense of complex phenomena and explore features thereof. Games, and in particular online games, seem to provide interesting features for capturing and dealing with complex problems. However, we argue that the games are not yet matured enough to fit the requirements for coping with specific professional settings. This leads us to propose a framework that includes games as one of four mechanisms. The framework is tested in a professional case.

**Measurement of Decision Maker's Performance in a Fuzzy Multi-attribute Decision Making**
Arbaiy Nureize[1], Junzo Watada[1]
[1]*Waseda University, Japan*

The performance measurement of decision maker's evaluation is important to recognize the efficiency of the decision makers in the decision making process. Besides the consideration of attributes, several decision evaluators may involve their preference and judgment. Decision makers tend to provide different evaluation though the same sets of problems are evaluated. Thus, the objectives of this paper are to provide a measure of the decision maker's performance in the fuzzy multi attribute decision making environment. A numerical example is given to illustrate the computational process of the proposed model.

**Performance Measurement Framework for Location Decisions on Supply Chain Design**
Seyed Hessameddin zegordi[1], Amirhossein khosrojerdi[1], Seyed Sajed jamali[2]
[1]*Tarbiat Modares University, Iran*
[2]*Iran University of Science and Technology, Iran*

Plant location is one of the most important strategic decisions on supply chain design. Existing literature emphasize on qualitative factors such as transport costs, exchange rates, labor rates and taxes. While there are existing models that capture qualitative variables, there is limited research linking these variables with measures of the firm's operational competitiveness and performance measurement framework. In this paper, we propose a framework that includes 3 parts: First, model which shows the performance measurement framework. Secondly, indicators for performance measurement and finally a method presented to evaluate through the model by using the suggested indicators.
In this study, EFQM model which is a performance measurement framework based on self assessment have been used. For the purpose of meaningful assessment, a relative value ascribed to the criteria within the EFQM. Basic scoring used during the assessment process is RADAR.

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| **Session** | Decision Analysis and Methods 3 |
| **Date** | 12/10/2009 |
| **Time** | 13:30 - 15:00 |
| **Room** | Montparnasse V |
| **Chairs** | Dong-Ling Xu, Sandor Bozoki |

**Extending the PROMETHEE II Method to Continuous and Combinatorial Multi-objective Optimization Problems: A First Model**

Yves De Smet[1], Bertrand Mareschal[1], Céline Verly[1]
[1]*Université Libre de Bruxelles, Belgium*

PROMETHE II is a multicriteria method based on pairwise comparisons. As a consequence, it cannot reasonably be applied to problems involving a large number of alternatives (such as for instance in combinatorial or continuous multi-objective optimization). The aim of this paper is to present an approach inspired by genetic algorithms that allows to overcome these difficulties. An illustrative example based on financial portfolio management is presented.

**Performance Evaluation of High-Performing IS Project Teams: An Analytic Network Process Approach**

Eddie Cheng[1]
[1]*Southern Cross University, Australia*

The evaluation of information system (IS) is a perennial decision problem for businesses as they seek to improve their performance and sustain a competitive advantage. The effective implementation of an IS essentially depends upon how effective individual, organizational, task-related, technological, and environmental factors are integrated to the organizational fabric. An important issue rarely addressed in the literature has been the evaluation of the project team during the implementation of IS. This paper examines and demonstrates how the analytic network process (ANP) can be used as an approach to evaluating high-performing IS project teams with the objective of assessing their performance against a stated remit. Through establishing an environment where the performance of an IS project team is evaluated properly, an organization will be better positioned to assess each IS investment and improve the performance of the team through appropriate strategies.

**Competition Decision Models Between Supply Chains Under Linear Demand and Asymmetric Information**

Baixun li[1], Yongwu Zhou[1], Bitao Peng[1]
[1]*South China University of Technology, China*

This paper discusses competition decision issues between two supply chains, in which each one has one manufacturer selling a substitutable product through one retailer who faces a linear price-sensitive demand. We assume that there exists asymmetric cost information between the two supply chains, and that the two chains as well as two members in each chain follow the Stackelberg game setting. We analyze four competition scenarios: both chains are decentralized; both chains are centralized; the leader chain is decentralized and the follower centralized; the leader is centralized and the follower decentralized. We find that the centralized decision is the dominant strategy for the leader, whereas for the follower the optimal strategy chosen depends on the production cost and the intensity of competition between two chains as well as on actions of the leader.

**Decision Dilemmas for Adaptation to Sea Level Rise: How to, when to?**

Oz Sahin[1], Sherif Mohamed[1]
[1]*Griffith University, Australia*

This paper is part of an ongoing research project designed to develop a dynamic model for assessing current and future vulnerability of waterfront properties to sea-level rise (SLR), and evaluate adaptation options. SLR is one of the best recognized effects of projected climate change in recent literature and is expected to continue for centuries. Increased storm surge height due to SLR may place many coastal properties in danger of erosion and inundation, and millions of people who live near sea may be forced to relocate. If SLR is a fact, decision makers will need to have better tools to understand the extent and timing of coastal hazards. Considering the complexity and dynamic nature of coastal systems interacting and changing over time, research focuses on modeling temporal and spatial variations of coastal flooding in assessing vulnerability of these systems to SLR.

**Valuation of R&D Investments for New Products: A Real Options Approach Focusing on Key Uncertainties**

Marc Wouters[1], Berend Roorda[1], Ruud Gal[2]
[1]*University of Twente, Netherlands*
[2]*Philips Lighting, Netherlands*

Firms make very significant investments in new product development (NPD) projects, yet the economic return on these investments is often uncertain. The technical success of NPD projects is one source of uncertainty, and also how the market (customers) will respond to the new product. But at the same time, there is often some flexibility that firms can exploit to deal with such uncertainties. Real options models can represent this uncertainty and flexibility. This paper presents a real options approach for valuing early-stage NPD projects, which is practically applicable in a complex setting: many uncertainties about technology and market; the order in which uncertainties are resolved and decisions will be made, cannot be fully specified in advance; transparency of the method is key; and interdependencies among NPD projects exist. The approach, which is implemented through a spreadsheet model, has been developed by Philips Lighting and university researchers, and it has been applied to support large NPD investment decisions.

**Multi-period Allocation of Ambulances to Casualty Cluster in a Disaster Relief Operation with Uncertain Demand**

Wenguo yang[1], Tiande guo[1], Tie liu[1], Jun huang[1]
[1]*Graduate University of Chinese Academy of Science, China*

Casualty relief in a disaster is one of the most important issues in emergency management. After the occurrence of a natural disaster, such as earthquakes, it is difficult to determine the precise casualty number due to lack of useful and effective information. In order to describe the uncertainty feature of the casualty, Scenario Analyze Method (SAM) is adopted, and multi-period robust optimization model on ambulances allocation (MROAA) are given based on multiple scenarios. Solution procedure for MROAA is presented also, which solves problem in two phases consisting of a sequence of knapsack problems and a shortest path procedure, respectively. A preprocessing rule which drastically reduces computation time of the algorithm is also introduced. Finally, results of the proposed model and algorithm are illustrated via a hypothetical earthquake case study.

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| **Session** | Decision Analysis and Methods 4 |
| **Date** | 12/10/2009 |
| **Time** | 15:30 - 17:00 |
| **Room** | Montparnasse V |
| **Chairs** | Poul Kyvsgaard Hansen, Wenguo Yang |

**Real-time Water Resource Allocation: Methodology and Mechanism**
Xiaoya Li[1], Jinchuan Cui[1]
[1]*Chinese Academy of Sciences, China*

Real-time water allocation is proposed to settle the water scarcity situation and to deal with the uncertainties brought by the uneven spatial/temporal distribution of precipitation. The problem is described as: how to allocate current water resources to meet different sectors' demands while considering differences in water use efficiency. We introduce data envelopment analysis(DEA) models to evaluate the efficiency and estimate the returns to scale of different sectors. Then we propose an improved Talmud algorithm by considering the economics efficiency evaluation. We also introduce two kinds of DEA based allocation approaches in this paper, and then propose a real-time water allocation mechanism to support the water allocation. This water allocation mechanism creates efficiency incentive effect by using dynamic water distribution approach instead of fixed proportional allocation. Here the real-time characteristic means that the allocation solution changes as current water amount available changes.

**Product Family Hierarchical Associated Design and Its Hierarchical Optimization**
Gang Du[1], Jianzhong Wang[1]
[1]*Tianjin University, China*

After reviewing the literature and methodology-related issues within the field of product family design, a deficiency in the current design and development of product family is pointed out. The concept of hierarchical associated design is proposed in this article, according to the deficiency, and the methods and models for realizing the notion above are described. A two-dimensional analytical model is constructed based on the composing levels and developing processes of product family. The optimization models to hierarchical associated design problems are grouped into two categories: overall-local and key-subordinate. The algorithms of the models are discussed in this paper.

**Visual PROMETHEE: Developments of the PROMETHEE & GAIA Multicriteria Decision Aid Methods**
Bertrand Mareschal[1], Yves De Smet[1]
[1]*Université Libre de Bruxelles, Belgium*

PROMETHEE and GAIA are multicriteria decision aid methods belonging to the family of outranking methods. PROMETHEE is prescriptive: it provides the decision-maker with rankings of a set of alternative decisions evaluated on several often conflicting criteria. GAIA is descriptive: it uncovers important features of the decision problem and assists the decision-maker in eliciting preferences and finalizing the decision. After a brief summary of the basis of PROMETHEE and GAIA, we focus on the new development of Visual PROMETHEE. We propose several visual representations to enhance the efficiency of the methods. In particular the PROMETHEE Diamond is used to visualize the PROMETHEE I partial ranking and the GAIA Brains representation can be used to facilitate the assessment of the criteria weights. These developments are illustrated on a numerical example.

**Liquid Crystal Display Technology Maturity Mapping Based on TRIZ**
Zhi-Guang Li[1], Xiao-Quan Li[2], Runhua Tan[1]
[1]*Hebei University of Technology, China*
[2]*Tianjin Light Industry Design Institute, China*

Liquid Crystal Display (LCD) technology has been a hot topic. LCD has developed into a stage of replacing Cathode Ray Tube (CRT). Mapping a technology maturity exactly is a key to develop a product strategy for enterprises. TRIZ is a theory and method to solve innovation problems. Based on the TRIZ theory, the maturity of LCD technology was been mapped in this paper.

**Application of DEA for Selecting Most Efficient Information System Project with Imprecise Data**
Soroosh Nalchigar[1], Seyed Mohammad Reza Nasserzadeh[1]
[1]*University of Tehran, Iran*

Selection of best Information System (IS) project from many competing proposals is a critical business activity which is very helpful to all organizations. While previous IS project selection methods are useful but have restricted application because they handle only cases with precise data. Indeed, these methods are based on precise data with less emphasis on imprecise data. This paper proposes a new integrated Data Envelopment Analysis (DEA) model which is able to identify most efficient IS project in presence of imprecise data. As an advantage, proposed model identifies most efficient IS project by solving only one Mixed Integer Linear Programming (MILP). Applicability of this method is indicated by using data set includes specifications of 8 competing projects in Iran Ministry of Commerce.

**Multiple-Fault Diagnosis Based on Binary Decision Diagram**
Kan Yuan[1], Shousong Hu[1]
[1]*Nanjing University of Aeronautics and Astronautics, China*

In this paper, a method is described about multiple-fault diagnosis based on Binary Decision Diagram (BDD). This method can be applied to digital systems of which the fault mechanism can be expressed by fault trees with independent basic events. First, to assure the unique structure of the final integrated BDD, a new rule is added into the component connection method for fault tree conversion to BDD. Then through comparing the probabilities of cut sets with the same length of Huffman code, the ordering of checking the fault source is determined. Finally an example is given to explain this process. Because this method has no need to simplify the integrated BDD and determine the minimal cut sets (MCSs), it's more suitable for computer execution and has higher efficiency than traditional methods of fault tree diagnosis.

**Application of Simulation in Designing a Secure Grid of Distributed Wireless Sensor Network**
Dibyendu Chakrabarti[1]
[1]*New Jersey Institute of Technology, United States*

An important practical application of secure sensor networks is to monitor an area that may be divided into a square grid, where the sensor devices may be placed at the points of intersection with reasonable precision. In this paper, a simulation method to analyze and design such a network is discussed. The use of simulation technique is essential to determine the robustness (in terms of connectivity and coverage) of the resulting network consequent upon the failure of a certain number of nodes, since the sensor nodes usually fail at random. Detailed design charts are constructed for the implementation of a secure sensor network using transversal designs.

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| **Session** | Poster Session 2 |
| **Date** | 12/10/2009 |
| **Time** | 15:00 - 15:30 |
| **Room** | Longchamps I & II |

**Supplier Management: Practice and Performance in Chinese Manufacturing Enterprises**
Xiao jing Wang[1]
[1]*Dongbei University of Finance & Economics, China*

Improving supplier management is a big challenge faced by many Chinese manufacturing organizations. This paper selects case study method to explore the supplier management experiences of 6 manufacturers in China. The exploration focuses on supplier selection, supplier relationship management and supplier performance measurement. The study result finds that all the 6 examined firms have their own supplier selection system, but attach little importance to supplier relationship. They do relatively well in supplier classification management, whereas are no good at supplier performance measuring.

**A Knowledge-based Discrete Event Simulation Approach for Supplier Selection with Order Allocation**
Akram Zouggari[1], Lyes Benyoucef[1], Vipul Jain[2]
[1]*INRIA, France*
[2]*IIT-Delhi, New Delhi, India*

This paper presents a novel approach for automatic fuzzy based knowledge acquisition, which clubs supplier selection process with order allocation for dynamic supply chains to cope up with market variations. It imitates the knowledge acquisition and manipulation in a manner similar to that of decision makers who has gathered considerable knowledge and expertise in procurement domain. According to this concept, those decision criteria for supplier selection are considered first through four classes (CLASS I: Performance strategy, CLASS II: Quality of service, CLASS III: Innovation and CLASS IV: Risk), which are qualitatively meaningful. Thereafter, using fuzzy logic, the criteria application is quantitatively evaluated. As a result, the proposed approach generates knowledge for decision-making, and thereafter, the developed combination of rules for supplier selection with order allocation can easily be interpreted, adopted and at the same time if necessary, modified by decision makers/practioners.

**The Line Haul Cost and Cost Drivers for Road Freight Transportation in China**
Ling Wang[1]
[1]*Nankai University, China*

In recent years, many companies of road freight transportation in China have suffered from performance decline and business distress because of the continual rise of the costs and the long-term downturn of the freight rate. The line haul cost model with light-duty truck for a round trip is developed, and sensitivity analysis and tornado graphs are conducted to estimate the line haul cost and to identify the cost drivers in this study. It reveals that the fuel cost accounts for more than half of the total cost and the average cost per ton-km is even higher than the average freight rate. The fundamental issue for China's road freight transportation is that the lower freight rate and the rising cost squeeze the profit margin down to no-profit even to deficit. The companies will lose the ability for improvement and innovation, and furthermore, may lose the competitiveness and sustainability.

**Adaptive Optimal Model and Algorithm for Distributed Inventory Allocation Based on Steiner Tree**
Shubin Si[1], Hongyan Dui[1]
[1]*Northwestern Polytechnical University, China*

This paper promotes an adaptive optimal model and algorithm for the distributed inventory system which includes one plant, m candidate distribution centers and time-varying customers. The inventory control policy (Q,s) is used in the distributed inventory system. First of all, we adopt theory of the weighted graph to built a mathematical model, which can convert general optimal mathematical model of the distributed inventory allocation to the weighted graph optimal model. Secondly, an adaptive optimal algorithm based on Steiner tree theory is presented to solve the mathematical model above. Finally, the results of numerical simulation show that the model and algorithm are effective. We discuss the sensitivity of potential cost reduction to the changes of inventory key parameters, such as demand of customers and the distribution center inventory capacity.

**Research on Collaborative Innovation System of Automobile Manufacturing Supply-demand Network**
Zhaofang Mao[1], Gang Wang[2], Xiaomei Li[1]
[1]*Tianjin University, China*
[2]*Tianjin FAW Xiali Automobile Co. Ltd, China*

The economic crisis broke out in 2008 has strongly impacted global automotive industry. Whereas, under the support of Chinese automotive industry rejuvenation program, Chinese automotive industry has obtained giant favorable turn in 2009, and becomes the only country which could increase the automobile production and sales volume and get satisfied profits in the whole world. The program also emphasizes that Chinese enterprises should carry out self-brand strategies and improve independent innovative abilities. On the basis of systematic investigation to several Chinese self-brand auto enterprises and joint venture companies, this paper firstly reveals the common problem of current automotive R&D system, and then establishes automobile collaborative innovation management model based on lean design thinking. Finally, it makes analysis to mutual relationship and collaboration factors of enterprises' internal departments and enterprise external organizations in R&D process. Only to put lean design thinking through the total product lifecycle from product conceptual design to the product after-sales service, could Chinese automotive industry achieve the overall collaborative independent innovation.

**Agents for Supporting Utility Tradeoff of Negotiation between Construction Contractor and Suppliers**
R.J. Dzeng[1], Nang-Fei Pan[2], Pei-Ru Wang[1]
[1]*National Chiao-Tung University, Taiwan*
[2]*National Cheng Kung University, Taiwan*

This research describes a decision-support model that helps business bargainers explore negotiable options for the procurement in the construction industry. The proposed model is consisted of three software agents. One agent supports the contractors' decision by allowing them to input their negotiation preferences, and another supports the suppliers. Either of agents is not aware of the preferences of the other. The third agent plays the role of middle man who receives the proposals from both sides and search for optimal negotiation result in terms of total utility. Compared to the actual agreement specified in the two surveyed project contracts, the negotiation results suggested by the model increased the total utility by as high as 10% based on the preferences of human bargainers.

**Electricity Futures Price Forecasting Based on Error Correction Model**
Long Zhang[1], Binqi Hu[1], Tao Cheng[1], Yong Zhou[1], Yongxi Zhang[2], Shaoyuan Lai[2]
[1]*Hunan Electrical Power Dispatch and Communication Bureau, China*
[2]*Changsha University of Science and Technology, China*

This paper analyses the forecasting price of electric futures at PJM power market. An error correction model is proposed to forecast price of electric futures. The model contains not only the lagged variables such as: futures prices and spot prices but also includes the long relationship between the futures prices and spot prices. Results show that the spot price is an important influence factor in the forecast of price of electric futures. Furthermore, the spot prices and futures prices are cointegrated, namely in the short term the spot prices and futures prices possibly deviate from the equilibrium condition, but in the long run they keep up the equilibrium relation. Finally, the proposed model is successfully applied to the price of electric futures forecast of the PJM power market.

**An Integer Programming Model for Load-Oriented Manufacturing Control**

Hao-yun Yan[1], Hong-yu Li[2]
[1]*Shanghai Dian Ji University, China*
[2]*Fudan University, China*

Order Review and Release (ORR) is a comprehensive approach to job-shop scheduling. Load-Oriented Manufacturing Control (LOMC) is an effective ORR method, and it restricts the workload of workstations by periodically release right orders into workshop. When selecting orders, "balancing workload" and "meeting order due date" are two contradict objectives. LOMC puts more emphasis on the latter. However, previous studies show that "balancing workload" is quite important, and priority should be given to "balancing workload" when order due dates show small difference. So it improves the order release procedure of LOMC by applying a 0-1 integer programming model to coordinate the two objectives delicately. The new method is named ILOMC (Integer-programming-model-based LOMC). Simulation experiments have been carried out to compare LOMC and ILOMC. Simulation results show that ILOMC outperforms LOMC as it can better balance workload.

**A Machine Setup Model for TFT-LCD Cell Back-End Process**

Yung-Chia Chang[1], Ping-Shun Chen[2], Pei-Chun Chen[1]
[1]*National Chiao Tung University, Taiwan*
[2]*Chung Yuan Christian University, Taiwan*

The cell process is the main part of thin-film transistor liquid-crystal display (TFT-LCD), and can be divided into front-end process and back-end process. Since the production machines of the cell process are the critical resources, maximizing the machine utilization and minimizing the loss of capacity become the major concern for production planning. This research studies the scheduling of machine setups in scribing and breaking station and in testing station (so called the cell back-end process). A customized machine-setup decision support system is proposed to assist shop-floor workers in the back-end process scribing and breaking station and testing station of a 5th generation TFT-LCD production facility to determine an appropriate timing to set up machines. Through a simulation study, it is found that the throughput of the proposed schedule and the machine setup effort in the bottleneck station are both outperformed the ones obtained by current methods employed in this facility.

**Design of Multi-job Customer Order Controlling Mechanism in Computer Aided Process Planning and Scheduling**

Xiang Zhang[1], Wei Wang[1], Chen Ye[1], Guoxin Wang[1]
[1]*Beijing Institute of Technology, China*

Customer order planning and scheduling (COPS) is an integral part of computer integrated manufacturing system (CIMS). Although many scheduling approaches have been proposed, the two features, i.e. the efficiency and the single shipment requirement are seldom considered simultaneously. Also the design of controlling mechanism for COPS is lack. In this study, we design a controlling mechanism to account for both the efficiency and the single shipment requirement by presenting two new measures, i.e. the critical ratio of the order and the ratio of order completion. Furthermore, we recommend a five-step-procedure to operationalize the proposed controlling mechanism. This helps easily identify the order fulfillment statue and provide useful feedback to the COPS system, thus helping develop a more effective and efficient CIMS.

**Minimizing Weighted Number of Tardy Jobs on Unbounded Single Batching Machine with Family Jobs**

Rui Zheng[1], Hong-yu Li[1]
[1]*Fudan University, China*

Batching machines are encountered in many different environments. The batching machine is able to process a number of jobs simultaneously as a batch. The scheduling problem to minimize weighted number of tardy jobs on a single batching machine with family jobs is proposed. The batch size is assumed to be unbounded and the processing time of a batch is equal to the longest processing time of the jobs assigned to it. Jobs that belong to different families can not be processed in a same batch. For the problem with fixed number of m families and n jobs, a pseudopolynomial time dynamic programming algorithm is presented.

**A DEA Evaluation of Software Project Efficiency**

Zijiang Yang[1], Joseph Paradi[2]
[1]*York University, Canada*
[2]*University of Toronto, Canada*

Software production has become a focus of major economic activities all over the world. This paper presents an evaluation of 63 software projects in a big Canadian bank using Data Envelopment Analysis (DEA). DEA model was developed to measure software project efficiency focusing on the factors that affect software productivity and suggestions were offered on how DEA could be used to improve their software production metrics. Finally, potential management uses of these DEA results were presented.

**Generating Large Scale Network for Solving the Flow Network Problems**

Shin-Guang Chen[1]
[1]*Tungnan University, Taiwan*

Since network analysis has been a formal topic in Operations Research as well as in Reliability, researchers may need to validate their models or theories with large scale feasible networks for test. This paper proposes an algorithm to generate a large scale capacitated/uncapacitated flow network for applications. Conventionally, NETGEN is employed for such purposes. However, this program is about 30 years old and no algorithms available for verifying the properties of the generated networks. In this paper, a theoretical aspect and new features are addressed. This algorithm is not an extension of NETGEN. The same 40 benchmarks of NETGEN are compared in this paper. NETGEN had a limited size of 8000 nodes and 35000 arcs in different networks. The limits of nodes and arcs are not constrained in the proposed algorithm. Unlike NETGEN involving thousand lines of codes, a sample code of no more than 40 lines is tested for examples.

**A Novel Approach for Crossover Based on Attribute Reduction – a Case of 0/1 Knapsack Problem**

Hsu-Hao Yang[1], Shih-Wen Wang[1], Hui-Ting Ko[1], Jin-Cheng Lin[1]
[1]*National Chinyi University of Technology, Taiwan*

This paper proposes a methodology that incorporates the process of attribute reduction in rough sets into crossover in genetic algorithms (GAs). We develop two algorithms on the basis of the methodology. The first one selects the crossover points either by attribute reduction or randomly; the second one selects the points only by attribute reduction and no crossover otherwise. We study 0/1 knapsack problem due to its NP-hard complexity and solution nature of binary form, and conduct experiments against typical GAs. According to the preliminary results, the incorporation of attribute reduction appears to generate larger means of final solutions and smaller standard deviations of final solutions, especially in the presence of tighter capacity. That is, better solution quality and more clustered solutions are obtained.

**An Affinely Adjustable Robust Optimization Approach to Emergency Logistics Distribution Under Uncertain Demands**

Feng Tang[1], Ling zhang[1], Jun huang[1], Wenguo yang[1]
[1]*Graduate University of Chinese Academy of Science, China*

After disaster, effective distribution of relief commodities to the affected areas is vital to minimize the loss. Generally speaking, the exact demand data are hard to obtain immediately after the disaster, which will cause difficulties to the decision-making process. In this paper, we present a prediction method of the relief demands after an earthquake. We also propose a distribution model considering the satisfaction rate of the relief demands and distribution cost. The uncertain demands are addressed by the Affinely Adjustable Robust Counterpart (AARC) method when the model is solved. Finally, a numerical experiment is given to demonstrate the computational efficiency of the proposed model.

**An Effective Linear Approximation Method for Geometric Programming Problems**
Chia-Hui Huang[1], Han-Ying Kao[2]
[1]*Kainan University, Taiwan*
[2]*National Dong Hwa University, Taiwan*

A geometric program (GP) is a type of mathematical optimization problem characterized by objective and constraint functions, where all functions are of posynomial form. The importance of GP comes from two relatively recent developments: (i) new solution methods can solve even large-scale GP extremely efficiently and reliably; (ii) a number of practical problems have recently been found to be equivalent to or approximated by GP. This study proposes an effective linear approximation method for solving geometric programming problems.

**Modeling a Bi-Criteria Two Stage Assembly Flow Shop Scheduling Problem with Sequence Dependent Setup Times**
Yasaman Maboudian[1], Rasoul Shafaei[1]
[1]*Khaje Nasir University of Technology, Iran*

In this paper, we address a two-stage assembly flow shop scheduling problem with sequence dependent setup times, which minimizes makespan (C_max) and maximum tardiness (T_max) as objectives. In this problem, there are n products to be produced; each product has m unique parts to be processed concurrently on m parallel machines at first stage, with each part on a specified machine. At the second stage final products are made by assembling m parts on a single machine. Sequence dependent setup times in both stages are considered as an important presumption to declare a more realistic problem. First, the problem is formulated by a non-linear mathematical model and a lower bound for the problem is proposed and some instances of different and fairly small size problems are generated and solved using Lingo 8.0 optimization software. Finally, the obtained results are compared with those of total enumeration and concluding remarks are made.

**Efficient Policies for an Inventory System with Power Demand Pattern and Mixture of Backorders and Lost Sales**
Joaquin Sicilia-Rodriguez[1], Jaime Febles-Acosta[1], Manuel González-De la Rosa[1]
[1]*Universidad de La Laguna, Spain*

In this paper we study an inventory model where shortages are allowed. We consider that the demand follows a power pattern. During the shortage period a fraction of the demand is backlogged and the remainder are considered lost sales. The objective consists of determining the lot size and the order level such that the total inventory cost per unit time is minimized. We present a general procedure to obtain the optimal inventory policy and the minimum associated cost.

**Modeling Physical Systems for Failure Analysis with Rate Cognitive Maps**
Manu Augustine[1], Om Prakash Yadav[2], Rakesh Jain[1], Ajay Pal Singh Rathore[1]
[1]*Malaviya National Institute of Technology, India*
[2]*North Dakota State University, United States*

This paper introduces a new modeling framework for failure analysis (FA) of physical systems namely “Rate cognitive maps”. The proposed cognitive map based framework provides a robust approach for identifying a large variety of possible failure modes in a dynamic environment through a new cognitive inference process. While this methodology allows the identification of possible failure modes at multiple levels of abstraction, the network like representation of physical systems makes it easier to track the root causes of identified failure modes.

**A Distribution Reverse Logistics Model Design Based on Green Supply Chain Management**
Xiaoqing Geng[1], Yu Wang[1], Cui Sun[1]
[1]*Tianjin University of Finance and Economics, China*

Reverse distribution, or the management of product return flows, induced by various forms of reuse of products and materials, has received growing attention throughout this decade. Growing green concerns and advancement of green supply chain management (GSCM) concepts and practices make it all the more relevant. Built on the concept of GSCM, this paper presents a mathematical programming model for a version of this problem - how to construct a distribution model for reverse logistics. Due to the complexity of the proposed model, we give a heuristic solution methodology for this problem. The solution methodology complements a heuristic concentration procedure, where sub-problems with reduced sets of decision variables are iteratively solved to optimality. Computational tests demonstrate that high-quality solutions are obtained while expending modest computational effort.

**Combination of Arrival Rate Prediction Method and the G/G/1/K Polling System with k-limited Service Discipline**
Shin-Yeu Lin[1], Shih-Cheng Horng[2]
[1]*Chang Gung University, Taiwan*
[2]*Chaoyang University of Technology, Taiwan*

In this paper, we proposed an arrival rate prediction method to combine with the previously developed ordinal optimization (OO) theory based algorithm for the G/G/1/K polling system with the k-limited service discipline so as to achieve the real-time application purpose. We employ the Box-Jenkins method for predicting the arrival rate every d_t period, which is the computation time of the OO theory based algorithm. The predicted arrival rates will serve as the current arrival rates in the OO theory based algorithm. We have tested the proposed method by comparing with the cases of using the actual arrival rate at t+d_t, which is considered as the ideal case, and the arrival rate at t, which is considered as the case without prediction, in the OO theory based algorithm. The test results show that the performance of the case without prediction is 11.6% worse than the ideal case, while the proposed method achieves a performance of only 4.5% worse than the ideal case.

**Particle Swarm Optimization-Based Machine Arrangement for Filling Construction of Rock-fill Dams**
Junwei Zeng[1], Li Wang[1], Tingliang Wang[1], Wenzhuo Fan[1], Hui Gao[1]
[1]*Beihang University, China*

The factors that can influence the equipment optimization in filling construction of rock-fill dam are explained by analyzing the filling system of rock-fill dams in this paper, and an optimization model for equipment organization of fill construction of rock-fill dam is established, in which the minimum of unbalanced degree of filling intensity is taken as the objective function with constraint. The quantum discrete particle swarm optimization is used in the model solution. Based on the optimization model and algorithm, the hydraulic engineering construction management decision support system is developed by using an object-oriented methodology. The system is applied to a practical project successfully to obtain the optimum solution of equipment organization.

**Finite Time Ruin Probability for Non-standard Poisson Model with Different Interest Rates**
Tao Jiang[1], Liyan Wen[1]
[1]*Zhejiang Gongshang University, China*

In this paper, the finite-time ruin probability with different interest rates for non-standard Poisson model is considered. Under the assumptions that the claim-arrival process is non-standard Poisson process, i.e. non-homogenous and conditional Poisson process, and the claimsize is subexponentially distributed, some simple asymptotic formulae of ruin probability within finite horizon are derived. The results we obtained extended the corresponding conclusion of related references for ordinary Poisson risk model.

**Analysis of Nonhomogeneous Input Data Using Likelihood Ratio Test**
Issac Shams[1], Kamran Shahanaghi[1]
[1]*Iran University of Science and Technology, Iran*

Performing an accurate input analysis in simulation experimentation basically involves selecting the exact probability distributions of random input variables. Frequently in practice these inputs are not constant over time i.e., the underlying distribution may be affected by their time-dependent parameters. In this paper, we propose an approach that can identify whether or not a set of observations follow an identical distribution in a

specific period. The model is formulated in a base of likelihood ratio test in the case that input observations come from nonhomogeneous exponentially random variable. Finally, performance comparisons are explored through simulation studies.

**Comparison Study of Three Diverse Passive Hydraulic Engine Mounts**

Yunxia Zhang[1], Ting Hao[1], Wenbin Shang-Guan[2], Qishan Feng[3]
[1]*Shanghai Normal University, China*
[2]*South China University of Technology, China*
[3]*Shanghai General Motors Corporation Ltd, China*

To describe the behaviors of vibration isolation, the dynamic models for three types of Passive Hydraulic Engine Mounts (PHEM) were developed in this paper respectively. The state equations were then introduced and solved by means of the Lumped-Parameter method and the Bond Graph procedure. Numerical results were presented for both low and high frequency responses. Then, comparative analyses were carried out. Comparisons showed that the PHEM (with inertia track, decoupler and throttle) behaved the best dynamic characteristics with means of frequency-dependent and amplitude-dependent. The bandwidth of frequencies was also extended to cover high frequencies, which could be the most favorite performance for the researchers and car-manufactures.

**Simulation Technology for NC Tube Bending Process**

Zhan Di Gao[1], Cheng Tong Tang[1], An Ming Chen[1]
[1]*Beijing Institute of Technology, China*

The collisions among a tube, dies and components of a bender often happen in tube bending process and forming quality of the tube will be damaged badly. Simulation technology for tube bending process is proposed to solve the problem. Assembly model and kinematics model for CNC tube bender are set up by analyzing the motion characteristics in tube bending process. Algorithm for collision detection with compound containing boxes of OBB and AABBs is proposed, and expandable OBB tree of tube segments is constructed to improve efficient of collision detection. The simulation system for tube bending process is developed to detect collision efficiently. Framework and function modules of the simulation system are introduced in detail. The simulation system is feasible by comparing the simulation result with the practical tube bending. The simulation technology for NC tube bending process makes it possible for tubing manufacture to change from traditional mode to digital and predictable mode.

**Performance of Ship Queuing Rules at Coal Export Terminals**

Tengku Rasydan Tengku Adnan[1], David Sier[2], Raafat Ibrahim[1]
[1]*Monash University, Australia*
[2]*CSIRO, Australia*

Shipping of bulk products such as coal, ore, grain and petrochemical products is an important part of maritime logistics. We study the port operations at two coal export terminals that have experienced substantial queuing in recent years. Both terminals are operated by a single port operator and service ships that come to pick up different brands of coal. The present work is part of a larger study to meet throughput requirements while achieving acceptable ship waiting times before being loaded. We focus our analysis on priority rules of how ships are routed into berths from a queue outside the terminals. Discrete-event simulation was used to understand the effect of using different rules for routing ships at various throughput requirements. The simulation model considered scheduled and unplanned breakdowns of loading machines, the influence of ship age on loading rates and product unavailability at the port. Performance profiles are generated for each rule.

**Congestion Control of Tcp/aqm Networks: Does the Simulation Tool Change Results?**

Teresa Alvarez[1], Anuar Salim[1], Mohamed Bolajraf[1]
[1]*University of Valladolid, Spain*

The simulation of congestion control algorithms of TCP networks is discussed in this paper. Simulation is a widespread procedure for testing and understanding how real systems evolve. Internet has a great impact in our society. Everyone wants fast and reliable links, but sometimes congestion happens because, the network delay and the number of users fluctuate from one moment to the next. There are different approaches for dealing with congestion: classical (such as drop tail or RED) or process control techniques (PID, predictive control or fuzzy). Future engineers need to learn about this topic. So, it seems logical to use simulation, but, which tools should we use? This paper presents a comparison using three different simulation programs: Matlab, EcosimPro and ns-2. Results show that depending on what we want, we should choose different tools.

**Integrated Design Using Dynamic Simulation of Reverse Osmosis Plants**

Luis Palacin[1], Tadeo Fernando[2], Cesar de Prada[2]
[1]*Centro de Tecnologia Azucarera, Spain*
[2]*University of Valladolid, Spain*

This paper presents a proposal for optimal design of desalination plants using dynamic simulation. In particular it is shown how using integrated design based on simulation, the plant structure can be improved and a better operation point can be achieved, with significant cost reductions. This integrated design takes into account the control structure for the final plant (predictive control) and the plant objectives: fulfil the changing water demand, minimizing the energy consumption and avoiding underflows or overflows of the storage tanks, taking into account several restrictions: operation limits, physical restrictions of the pumps and the necessity of periodic cleanings.

**An Approach Combined Response Surface Method and Particle Swarm Optimization to Ship Multidisciplinary Design Optimization**

Hesham Gorshy[1], Xuezheng Chu[1], Liang Gao[1], Peigen Li[1]
[1]*Huazhong University of Science and Technology (HUST), China*

Ship design is a complex endeavor requiring the successful coordination of many different disciplines. According to various disciplines requirements, how to get a balanced performance is imperative in ship design. Thus, a all-in-one Multidisciplinary Design Optimization (MDO) approach is proposed to get the optimum performance of the ship considering three disciplines, structure; cargo loads and power of propulsion. In this research a Latin Hypercube Sampling (LHS) is employed to explore the design space and to sample data for covering the design space. For the purpose of reducing the calculation and saving the develop time, a quadratic Response Surface Method (RSM) is adopted as an approximation model for solving the system design problems. Particle Swarm Optimization (PSO) is introduced to search the appropriate design result in MDO in ship design. Finally, the validity of the proposed approach is proven by a case study of a bulk carrier.

**Evaluating the Information Systems Success of ERP Implementation in Taiwan's Industries**

Wen-Hsien Tsai[1], Tsen-Shu Tsaur[1], Yu-Wei Chou[1], Jau-Yang Liu[1], Jui-Ling Hsu[2]
[1]*National Central University, Taiwan*
[2]*Feng Chia University, Taiwan*

Enterprise Resource Planning (ERP) system serve enterprise to integrate both business processes and information systems with transmission accuracy and real-time requirement. This work presents a completely survey of Taiwan's firms that focus on their implementating packaged ERP system. The objective was to evaluate the information system performance by the DeLone-McLean Model (1992) of information systems success, to measure the service quality provide by ERP system vendor and consultant presented by Parasuraman, et al. (1988) method of five dimensions of service quality, and also to examine the relationship between service quality and system performance using Structure Equation Modeling (SEM) technique. Finally, the result shows that the enterprises in Taiwan have higher service quality supported from ERP system vendor and consultant will make better performance in ERP implementation.

**Royalty Analysis for BOT Projects Based on The Negotiation Viewpoint**

Chao-Chung Kang[1], Cheng-Min Feng[2], Chiu-Yen Kuo[2]
[1]*Providence University, Taiwan*
[2]*National Chiao Tung University, Taiwan*

This study constructs three royalty negotiation models, including the lump-sum royalty, operational revenue-based royalty, and operational output-based royalty, using the bi-level programming approach. In addition, this paper also develops the heuristic algorithm for bi-level programming problem for the government and the private sector. A number of factors were incorporated into this algorithm including concession rate, time value discount rate, learning rate and number of negotiations.

**Investigation of ERP Implementation Problems in Organization Environment**

Wen-Hsien Tsai[1], Wan Rung Lin[1], Sin-Jin Lin[1], Jui Ling Hsu[2]
[1]*National Central University, Taiwan*
[2]*Feng Chia University, Taiwan*

In this study, the effect of ERP implementation problems on ERP performance improvement level is explored about organization environment risk, and DeLone and McLean's IS success model is used to measure ERP performance improvement level. Our research results indicate that the most frequent post-implementation problems is in top managers' participation, and then firm's policies and process, project redevelopment, organization transform and organization environment transformation, respectively.

**Research on the Institutional Innovation of Agent Construction System for Government Investment Project: A Perspective of Critical Governance Factors**

Yi-lin Yin[1], Min Yan[1]
[1]*Tianjin University, China*

The Agent Construction System (ACS) for government investment project is a primary solution for investment system reformation in China mainland. However, ACS has encountered some problems in its implementation. By analyzing the institutional issues in ACS and the contractual structure in Agent Construction Project (ACP), it identified Critical Governance Factors (CGFs) with project governance analysis framework at three levels of institutional design. On the basic of these CGFs, it analyzed the current implementation situation of ACS in some regions and main problems of ACS implementation at three different levels. In addition, the article has presented some institutional innovation methods for those problems in relation to these levels. It can be concluded that the ACS reformation should took these methods into account and formulated more suitable measurements for the sound development of ACS.

**The Relationship Between Planning & Control Risk and ERP Project Success**

Wen-Hsien Tsai[1], Sin-Jin Lin[1], Wan Rung Lin[1], Jau-Yang Liu[1]
[1]*National Central University, Taiwan*

Enterprise resource planning (ERP) projects have often been found to be complex and risky to implement in business enterprises. Thus, an understanding of the risk factors inherent in implementing ERP projects can help to reduce the incidence of failure. The results not only revealed which planning & control risk factors are associated with ERP project implementation, but also showed that management must be aware of the critical risk factors and their impact on ERP project success. Based on this study's findings, management must mitigate or eliminate significant risk factors such as schedule overrun, budget overrun, unclear goals, and ineffective communication. This intervention would increase the success rate of an ERP project.

**Multi-criteria Evaluation Model for a Software Development Project**

Chang-Lin Yang[1], Rong-Hwa Huang[1], Ming-Ta Ho[1]
[1]*Fu Jen Catholic University, Taiwan*

Although the effectiveness of a project is determined by the level the project achieves, fairly and objectively assessing the effectiveness of an ad hoc model of project management is of priority concern. Since enterprises typically have limited resources for project, companies also want to review how many economic benefits are created by the costs of project inputs. However, some benefits are not easily quantified. This study focuses on project construction and assesses the effectiveness of the proposed evaluation model. This model has four dimensions: commercial effectiveness; customer relationship; execution process; and, organizational growth and innovation. In total, the model uses 50 criteria. The Analytical Network Process (ANP) proposed by Saaty is utilized to determine the importance of weights for each dimension, strategic subject and measurement indicator.

**Hand-sand: A Tool for Simulating Handover Techniques in Cellular Networks**

Teresa Alvarez[1], Javier Crespo[1], Eduardo Hernandez[1]
[1]*University of Valladolid, Spain*

This paper presents HAND-SAND, a tool for learning and testing different handover techniques when cellular phones move from one cell to another. It has been implemented using Arena, a discrete event based simulation environment. The importance of cellular phones in today's communications cannot be denied. Fifteen years ago, mobile communications were something rare and unusual, but now, almost everyone has one or more cellular phones. Not too many people, however, understand this technology. This application presents different handover techniques and how results can be analyzed. It is intended for use with Computer Science and Telecommunication students. The objective is to try different handover techniques and compare results.

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| **Session** | Technology and Knowledge Management 7 |
| **Date** | 12/11/2009 |
| **Time** | 09:00 - 10:30 |
| **Room** | Luxembourg I |
| **Chairs** | Fernando Tadeo, Chien Chiang Lin |

**Knowledge Management and Innovation: The Mediating Effects of Organizational Learning**

Shu-Hsien Liao[1], Chi-Chuan Wu[1]
[1]*Tamkang University, Taiwan*

The relationship between knowledge management and innovation is very critical in knowledge economics However, without good capability of organizational learning, one organizational can't retain some important knowledge management practices and increase innovation. This study tries to set a model figuring out the moderating effects of organizational learning between knowledge management and innovation based on Common Wealth Magazine's Top 1000 manufacturers and Top 100 financial firms in Taiwan 2007. The result reveals that the relationship among knowledge management, as well as organizational learning and organizational innovation utilizing structural equation modeling. The results show that organizational learning is the mediating variable between knowledge management and organizational innovation. Therefore, knowledge management is an important input, and organizational learning is a key process, then organizational innovation is a critical output.

**Information Sharing Based on Social Network Construction Under Dynamic Alliance Environment: A Simulation Study**

Xiaobo Wu[1], Wei Dou[1], Luxi Chen[1]
[1]*Zhejiang University, China*

This paper examined the social network construction mode based on connected network component under dynamic alliance environment. We assume that firms in one industry participant in alliances dynamically and simulation results show how the alliance network factors influence the social network information sharing performance. Four propositions in a long-term and no extreme value context are built: first, the probability an incumbent is chosen to become a member of a new alliance has a inverted U-shape effect on information sharing performance; second, the probability that the alliance being assembled will include a previous collaborator of an incumbent on the alliance has a inverted U-shape effect on information sharing performance; third, the initiate alliance size has a positive effect on information sharing performance; fourth, the max time during which a firm is not in any alliance has a positive effect on information sharing performance.

**Customization Process Applied to the Design of Assistive Devices**

Hung Bin Wang[1], Ding Bang Luh[1], Kuo Li Huang[2], Rain Chen[2]
[1]*National Cheng Kung University, Taiwan*
[2]*Southern Taiwan University, Taiwan*

There has been a considerable amount of research on assistive device design, yet there is a lack of investigation concerning the design process. Existing assistive device design is mainly focused on customization design, with research and design commonly undertaken with a focus on case studies, yet the burden of assistive device customized design faced by the economically disadvantaged and disabled is even greater. This research is based mainly on the USERfit assistive device design process. It introduces the concept of tailored customization into the assistive device design process and adds expert evaluation, resulting in a new assistive device design process - The Tailored Customization Assistive Device Design Process, TCADDP. This research continues by using assistive drawings as examples, channeling the TCADDP into the assistive drawing devices for children with Cerebral Palsy, and through expert evaluation and revision, proves that assistive drawing device can improve other drawing situations faced by the physically disabled, and verifies that the TCADDP can simultaneously satisfy the usage and economic demands of the disabled in assistive device design, and help a greater number of people with disabilities.

**Relationship between Knowledge Sharing and Absorptive Capacity Mediated by Organizational and Technology Factors: a Conceptual Model**

Luciana Andrawina[1]
[1]*Bandung Institute of Technology, Indonesia*

The current tougher competition has established the leading role of knowledge as the capital in order to gain competitive advantage. Knowledge has become significant resources to the company to innovate continuously. Knowledge is embedded in the employees and created by the employees as well; therefore, the companies' ability to innovate will depend on it's employees knowledge sharing behavior and absorptive capacity. This study develops a conceptual model to explain the relationship between knowledge sharing and absorptive capacity influenced by moderating variables, namely organizational factor and technology factor. Knowledge sharing which consists of donating and collecting knowledge is considered to have influence towards the employee's motivation and ability. The two moderating variables considered in this study are top management support from organizational factor and information and communication use from technology factor.

**Knowledge Spillover of Core Human Intelligence in Industry Cluster**

Hong Cai[1], Qili Lian[1], Qin Li[2]
[1]*Huazhong University of Science and Technology, China*
[2]*Zhengzhou University, China*

One decisive element for the development of industry cluster is human intelligence deployed especially those who possess the core and decisive knowledge for the potential development of local district. How to manage their knowledge to the most possible extent become essential. However, literatures on this theme need to be integrated and analyzed to draw a clear map.
In this research, firstly core human intelligence for industry cluster are distinguished based on characteristics of industry cluster. Knowledge management method for this special group of research target is discussed. Next, a survey is conducted in Zhongguan Village, a most concentrated area of IT industry clusters in Beijing. Interviews and questionnaires are adopted. Finally, the characteristics and influences of knowledge management for core human intelligence in IT industry cluster are sketched out.

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| **Session** | Technology and Knowledge Management 8 |
| **Date** | 12/11/2009 |
| **Time** | 11:00 - 12:30 |
| **Room** | Luxembourg I |
| **Chairs** | Barbara Cimatti, Tomoko Saiki |

**A Meta Analysis of the Innovation Issue:Based on the Technology Management Field**
Shann-Bin Chang[1], Shu-Min Chang[2]
[1]*Ling Tung University, Taiwan*
[2]*Nan Kai University of Technology, Taiwan*

Technology Management is an emerging discipline in social science, which not only has high complexity, but also combines multiple knowledge systems. What have been the major issues of technology management during the past two decades? Which one issue is the core issue of technology management? If we look at the journals which were published after 1980, including Research Policy, Technovation, IJTM, IJIM, we find the word "Innovation" was appeared frequently appears in the titles of papers and the names of the journals. That means "innovation" is a very important issue of technology management. This paper uses meta analysis to examine the literature about the innovation issue in the technology management field, and to achieve the following two objectives: 1. finding the major journals devoted to innovation issues; and 2. analyzing the basic profile of innovation literatures. Finally, this paper provides the basis for two future studies at the end of this paper.

**Applying Rough Set Theory in Evaluating the Competitiveness of Modern Service Industry in Guangdong Province**
Wenjing Yu[1], Yuanbiao Zhang[1], Minglang Cui[1], Zhou Li[1]
[1]*Jinan University, China*

In this paper, we make an attempt to introduce rough set theory into an evaluation modeling approach of modern service industry competitiveness. Since its proposal in 1982 by Z.Pawlak, rough set theory has already been successfully applied to a series of research domains. Surprisingly however, the approach has never been applied to modeling industry competitiveness evaluation. In this paper, we design the evaluation index system of modern service industry, build a comprehensive evaluation model based on rough set theory and evaluate the competitiveness of modern service industry in Guangdong compared with the other 13 provinces and cities in China. We further point out the existing problems of the development of modern service industry in Guangdong province and put forward some suggestions.

**Predict the Trend of Information Technology Knowledge Applied in Healthcare Management**
Hong Feng Lai[1]
[1]*National United University, Taiwan*

The information technology (IT) might improve the performance of healthcare organizations and offer better service in competitive environment. However, it is difficult to forecast the trend of knowledge development and to choose and introduce the appropriate ones, owing to lack of theoretic methods. In this paper, we propose a feasible appraising structure based on grey theory to predict the trend of IT knowledge items applied in the field of healthcare management (HM). In this study, we exploit the Google scholar searching engine to collect raw data by keywords of IT knowledge items and HM. We suppose that the numbers of searching result including papers and books interpreting knowledge prevalence. The forecasting data is produced by grey theory, while the forecasting accuracy is indexed by mean absolute percentage error. Thus, the managers of healthcare might introduce an IT knowledge item according to its development trend and phase state of life cycle.

**Research on Knowledge Fermenting in Product Innovation**
Jingbin Hao[1], Robert E. Williams[1], Liang Fang[2], Renping Xu[3]
[1]*University of Nebraska-Lincoln, United States*
[2]*China University of Mining and Technology, China*
[3]*Kunming University of Science and Technolgoy, China*

The product innovation contains a series of knowledge activities, such as knowledge assimilation, conversion, creation and dissemination. Knowledge management is the crucial issue for the efficiency and quality of product innovation. In this paper, knowledge fermenting (KF) model has been applied to analyze the process of product innovation. The key factors and feedback control of knowledge fermenting are investigated to construct a theoretical basis for the better management of product innovation in the future.

**Exploring the Disruptive Nature of Disruptive Technology**
Alan Pilkington[1]
[1]*Royal Holloway, University of London, United Kingdom*

Christensen's ideas on disruptive technology (DT) have undergone much debate in mainstream strategy and innovation literature, largely concerning the difficulties in their application. The main issue seems to be the paradox of encouraging the development of, to all intense and purposes, uncompetitive technologies. This paper uses bibliometric techniques to examine the spread and influence of DT, and whether DT itself has behaved as a DT. In particular a scientometric analysis of the DT literature – defined as articles which cite either of Christensen's books. The analysis identifies the rate of spread of DT and the periphery areas where DT has seen continued application well away from the core of strategy and technology management. These include clearly defined clusters in economics of market orientation, modularity, legal perspectives on technological change, and environmental and regional geography.

**Roadmap from Technology to Industrialisation: The Case of South Africa**
Michael Kachienga[1]
[1]*University of Pretoria, South Africa*

Economic growth in the emerging economies has been attributed to technological entrepreneurship and industrialisation. In South Africa there have been various initiatives by the government and private sector to jump-start industrialisation and promote national economic growth.
The paper brings fresh thinking in linking the concepts of technology colony and industrialisation. A definition of technology colony is provided to enhance the understanding of technology transfer as a stimulant of industrialisation processes. Strategies for promoting industrialisation and national economic growth are discussed and recommendations are provided.

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| **Session** | Production Planning and Control 4 |
| **Date** | 12/11/2009 |
| **Time** | 09:00 - 10:30 |
| **Room** | Luxembourg II |
| **Chairs** | Anil Varma, Joaquin Sicilia-Rodriguez |

**Workload Control with Continuous Release**
Bach Su Nguyen Phan[1], Martin Land[1], Gerard Gaalman[1]
[1]*University of Groningen, Netherlands*

Workload Control (WLC) is a production planning and control concept which is suitable for the needs of make-to-order job shops. Release decisions based on the workload norms form the core of the concept. This paper develops continuous time WLC release variants and investigates their due date performance in a simulation study. The results indicate that - while lowering workload on the shop floor - the percentage of jobs tardy can be reduced significantly when the appropriate release approach is applied. However a detailed analysis also reveals that the reduction is realized at the cost of extreme delays for a small set of jobs with high processing time requirements. To explore the possibilities of overcoming this negative side effect, adaptations of the continuous release approaches are studied in successive experiments. The results suggest that the continuous release methods will need the help of e.g. output control to avoid the extreme delays.

**A Survey of Metal Working Companies' Readiness for Process Planning Performance Measurements**
Staffan Anderberg[1], Tomas Beno[1], Lars Pejryd[1]
[1]*University West, Sweden*

The paper presents an investigation regarding the potential and the readiness for implementing performance indicators and performance measurement systems of the process planning work for metal working companies. The paper is based on a questionnaire survey distributed to process planners in the Swedish metal working industry. The main outcome of the investigation is a foundation for understanding the implementation of performance measures of the process planning work for CNC machining. The survey revealed a few strengths and short comings in the studied companies.

**Combination of Genetic Algorithm and LP-metric to Solve Single Machine Bi-criteria Scheduling Problem**
M.Bahador Aryanezhad[1], Armin Jabbarzadeh[1], Abalfazl Zareei[1]
[1]*Iran University of Science and Technology, Iran*

This paper addresses single machine bi-criteria scheduling problem with the aim of minimizing total weighted tardiness and weighted number of tardy jobs. While weighted number of tardy jobs measures the service quality provided to customers, total weighted tardiness quantify the magnitude of lateness of each job. Therefore, considering both objectives, simultaneously, will provide the highest customers satisfaction. Both objectives are known to be NP-hard, thus, Genetic Algorithm is hired to solve the problem. Since LP-metric method is a rigorous multi-objective technique for making a combined dimensionless objective, it is used to navigate the search direction of Genetic algorithm. In this way, we can reach to some of solutions that are compatible to decision maker's opinion while overcoming the issue of problem complexity. Finally for testing the efficiency of the proposed approach, some test problems are solved.

**A Methodology of Tool Lifecycle Management and Control Based on RFID**
Guoxin Wang[1], Hidehito Nakajima[2], Yan Yan[1], Xiang Zhang[1], Lu Wang[1]
[1]*Beijing Institute of Technology, China*
[2]*Big Daishowa Seiki Co Ltd, Japan*

Radio frequency identification (RFID) technology offers the possibility of significantly enhancing tool management and control process. A methodology of tool management and control based on RFID is proposed. In this proposed methodology, tool management and control process is mainly divided into two stages: tool preparation and tool usage. In the tool preparation stage, a centralized database which includes the information of cutting tools, fixtures, gauges, machines, parts, NC programs and work instructions is built. These information can be transmitted automatically to CAM and simulation software. In the tool usage stage, using RFID technology to control the process of tool storage and retrieval, presetting, condition monitoring and breakage is discussed. In addition, the IC chip encoding format is given for the tool management and control. Finally, a tool management and control software—Factory Manager—is developed to illustrate the application of the proposed methodology.

**A Visual Cutting Tool Management Pattern for Flexible Manufacturing Systems**
Guoxin Wang[1], Yan Yan[1], Hidehito Nakajima[2], Xiang Zhang[1], Hairui Li[1]
[1]*Beijing Institute of Technology, China*
[2]*Big Daishowa Seiki Co Ltd, Japan*

Tool management is an important element in the efficiency of flexible manufacturing system. In order to supply fast and accurate results of tool preparation, a visualized cutting tool management methodology is presented. In the proposed methodology, a cutting tool management pattern and its detailed management process, including list management, tooling management, all tools management, standard tool management and Details of tool management are first introduced. On the basis of the cutting tool management pattern, a visualized tool management process that can manage the pictures, movies and audio files of the tools and deal with drawing composition is discussed. In addition, the management of insufficient tools and unnecessary tools that can trace the status of tools and improve the quality of tool preparation is introduced. Finally, a web-based visualized cutting tool management system is developed based on the proposed methodology.

**A GRASP Algorithm for the Two-Machine Flow-Shop Problem with Weighted Late Work Criterion and Common Due Date**
Amir hasanzadeh[1], Hamid afshari[1], Kamran kianfar[2], Mehdi fathi[3], Afshin Oroojlooy Jadid[2]
[1]*AmirKabir University of Technology, Iran*
[2]*Isfahan University of Technology, Iran*
[3]*Iran University of Science and Technology, Iran*

In this paper, a metaheuristic approach for the two-machine flow-shop problem with a common due date and the weighted late work performance measure (F2|dj=d|Yw) are presented. The late work criterion estimates the quality of a solution with regard to the duration of the late parts of jobs, not taking into account the quantity of the delay for the fully late activities. Since the problem mentioned is known to be NP-hard, a trajectory methods, namely GRASP is proposed based on the special features of the case under consideration. Then, the results of computational experiments are reported, in which the metaheuristic solution is compared with exact approach and three other heuristic methods' results.

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| **Session** | Production Planning and Control 5 |
| **Date** | 12/11/2009 |
| **Time** | 11:00 - 12:30 |
| **Room** | Luxembourg II |
| **Chairs** | Renzo Akkerman, Timo Knuutila |

**Preference-based Adaptive Genetic Algorithm for Multiobjective Advanced Planning and Scheduling Problem**
Junyu Yang[1], Wencheng Tang[1]
[1]*Southeast University, China*

In this paper, minimizing machine idle time and minimizing earliness-tardiness penalties are considered as two objectives in advanced planning and scheduling (APS). The APS problem is formulated as a mixed integer programming model. Constraints including precedence, alternative machine, capacity, and setup and transition times are taken into account. A preference-based adaptive genetic algorithm is applied to solve the model. Numerical experiments are performed to illustrate the effectiveness and efficiency of the developed algorithm.

**Multi-conditioned and Capacitated Production Planning Model for Remanufacturing System**
Liu Guangfu[1], Yang Xiaowen[1]
[1]*Tongji University, China*

This paper discusses the remanufacturing process which takes different quality conditions of disassembled parts and different capacity conditions of remanufacturing production lines into account. We propose a simple multi-conditioned and capacitated production planning model for remanufacturing system, and develop a mixed integer programming model to minimize the total cost of the capacitated remanufacturing system, including the inventory holding cost, the operation cost, and the set up cost. The model is validated by an illustrative example with a set of experimental data and considering lots of special situations. Its results are presented by using the math programming software Lingo 10.0.

**Scheduling With Uncertain Processing Times: Applying β-Robust Schedule On Two-Machine Flow-Shop With Constraints**
Saif Ullah[1], Qiong Liu[1], Chaoyong Zhang[1], Yasser Awan[1]
[1]*Huazhong University of Science and Technology, China*

Scheduling of jobs is momentous to augment production rate, reduce production expenses, trim down jobs completion times etc. However, changes in the sequence of jobs on machines as well as the uncertainties in actual processing times of jobs produces variations in the performance of flow-shop schedule. In these circumstances, the risk of attaining schedules' performance level inferior than a certain limit is an imperative evaluator for the efficiency of jobs schedule. To muddle through the risk in two-machine flow-shop where total flow-time is considered as a performance measure, a constraint based β-robust schedule is anticipated to minimize the risk of exceeding total flow-time from a certain limit. The presented constraints are applied for scheduling of jobs in two-machine flow-shop of a manufacturing company in China. Result reveals that the proposed constraints yields a schedule with maximum probability of attaining total flow-time less than a threshold and the obtained schedule has minimum risk of exceeding total flow-time from a certain limit.

**A Closed-Loop Approach to Continuous Process Scheduling**
Christoph Schwindt[1], Sascha Herrmann[2], Hanno Sagebiel[1]
[1]*Clausthal University of Technology, Germany*
[2]*Fraunhofer Gesellschaft, Germany*

We consider the short-term scheduling of continuous multiproduct plants. We follow a closed-loop approach which starts from a decomposition of the problem into an operations planning and an operations scheduling problem. The solution to the operations planning problem provides a set of operations with fixed operating conditions. The operations scheduling problem consists in sequencing those operations on the processing units of the plant. Having computed a feasible schedule, we return to the planning phase, where we re-optimize the operating conditions. We proceed with scheduling the operations again and iterate the planning and scheduling phases until a fixed point is reached. This method is able to find good feasible schedules for complex benchmark instances within a few minutes of computation time.

**Joint Economic Lot Size Model with Quality Improvement for A Single Supplier and A Single Buyer Cooperative Collaboration**
Docki Saraswati[1], Andi Cakravastia[2], Bermawi P. Iskandar[2], Abdul Hakim Halim[2]
[1]*Universitas Trisakti, Indonesia*
[2]*Institut Teknologi Bandung, Indonesia*

This paper explores the impact of quality improvement on joint economic lot size (JELS) models. It begins with the individual optimality of a supplier, that makes the deliveries during the production period, as soon as the quantity is equal to the batch size. The individual optimality of the buyer is based on the Economics Order Quantity (EOQ) model, while the supplier is based on the Economic Manufacturing Quantity (EMQ). A cooperative collaboration is stated based on a long-term agreement for sharing information. The result of the study shows that the JELS with quality improvement will provide smaller sub-lot sizes and lower joint total cost of 2.25% compares to the JELS without quality improvement. The purpose of quality improvement is to increase the proportion of conforming items. The result shows this proportion can only be improved under 0.879 and this value depends on the parameters in the investment function.

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| **Session** | Facilities Planning and Management 1 |
| **Date** | 12/11/2009 |
| **Time** | 09:00 - 10:30 |
| **Room** | Luxembourg III |
| **Chairs** | Wooseung Jang, Ziqi Liao |

**Hub Arc Selection for Freight Consolidation**
Sean Carr[1], Wooseung Jang[2]
[1]*North Carolina State University, United States*
[2]*University of Missouri, United States*

This research is designed for manufacturing companies with sparse transportation networks to evaluate the strategic possibility of private shipment consolidation, to screen a network for opportunities to implement consolidation policies, and to optimizes the network design to maximize the amount of transportation cost savings. The proposed mathematical models and solution methodologies determine the most advantageous set of hub-to-hub routes for the consolidation and transportation of less-than-truckload (LTL) shipments. A non-linear binary integer model is developed and a specialized methodology, which solves the problem through feasibility test and sub-model optimization, is proposed. Numerical results based actual data from the domestic LTL network of a large U.S. manufacturer show that up to 20% transportation cost saving is possible for certain hub-to-hub routes.

**A Study on Fuzzy Decision of Facility Management Outsourcing Based on SWOT Analysis**
Ji-ming Cao[1], Qian Li[1]
[1]*Tongji University, China*

The paper has built a quantitative fuzzy decision model for FM (facility management) outsourcing. Firstly, an evaluation index system has been built based on SWOT analysis. Then a mathematical method integrating AHP, Fuzzy math and geometry is introduced for computing the geometric decision vector of FM outsourcing. Through a geometrical analysis on the vector, the dominant factor of the FM outsourcing is revealed and the outsourcing decision is suggested. Finally, an empirical study on FM outsourcing of a transport hub is carried out so as to show how the decision model works.

**Planning Block Widths for Storage Yards of Container Terminals with Parallel Blocks**
Jörg Wiese[1]
[1]*University of Paderborn, Germany*

Container terminals have different layout structures depending on the equipment used and the orientation of their storage blocks. In this paper we discuss the influence of different block widths on the yard performance for a terminal with parallel blocks. Different trade-offs are described that have to be taken into consideration when planning the block width of a container terminal yard. Formulas are derived to estimate expected travel times for trucks and yard cranes for different possible block widths. For an exemplary scenario numerical results are presented. The results for the exemplary scenario show that an optimal block width regarding the yard performance has eight rows.

**Scheduling of Stabilization Surgical Cares in Case of a Disaster**
Issam Nouaouri[1], J-Christophe Nicolas[1], Daniel Jolly[1]
[1]*Université d'Artois, France*

In this paper, we focus on assigning and scheduling stabilization surgical cares in operating rooms in case of a disaster. In such situation, surgeons are nomadic. Each victim is characterized by an emergency degree and a ready date in the hospital. In order to satisfy the increasing surgical need, the medical staffs can be reinforced during the time. The objective function defers those used in normal situation, it is about saving the maximum of human lives. So, we propose an integer linear program performed by the Cplex solver. Computational experiments show that a substantial aid is proposed by using this program.

**A Cost-Based Set-Covering Location-Allocation Problem with Unknown Covering Radius**
Mahdi Bashiri[1], Fateme Fotuhi[1]
[1]*Shahed University, Iran*

This paper proposes a covering problem in a discrete space where the covering radius is unknown and will be determined according to the distances among existing facilities and candidate points. On the other hand, cost of servicing is considered in our formulation as an important factor for allocating each demand point to the service point which is covered by. The problem is to find coverage radius, minimum number of service points, their locations in such a way that each customer shouldn't travel so far for servicing and the optimal allocation of demand points to service points to minimize the total cost of allocation or transportation. A multi-objective formulation is proposed for this problem and TOPSIS For MODM will be used for optimizing the problem. Finally a numerical example iillustrates the results of proposed model.

**A Study on Competitive Location of Express Operation Station**
Changjun Xu[1], Dacheng Liu[1], Zhingfang Lu[1], Jianhua Jiang[1], Xin Zheng[1], Shan Huang[1]
[1]*Tsinghua University, China*

This thesis studies stackelberg competitive location problem of express operation station. Stackelberg competitive location planning model and market demand distribution model are established. Planning model based on attraction thought way that the leader making-decision of location of operation station is affected by decision- making of the follower, and considering market demand, delivery cost and management cost, in order to maximize the converted net profit of leader and follower. An example is given to illustrate.

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| **Session** | Engineering Education and Training 1 |
| **Date** | 12/11/2009 |
| **Time** | 11:00 - 12:30 |
| **Room** | Luxembourg III |
| **Chairs** | Frode Eika Sandnes, Fu-Man Hsieh |

**The Influence of Transformational Leadership and Support for Innovation on Organizational Innovation: from the Vocational High School Teachers' Perspective**

Hsi-Chi Hsiao[1], Jen-Chia Chang[2], Ya-Ling Tu[3]
[1]*Cheng Shiu University, Taiwan*
[2]*National Taipei Univeristy of Technology, Taiwan*
[3]*National Changhua University of Education, Taiwan*

The purpose of this study was to investigate the influence of the transformational leadership and support for innovation on organizational innovation from the vocational high school teachers' perspective. This study used the stratified random sampling method to select 450 teachers from 18 vocational high schools in Taiwan. There were 293 valid questionnaires, and the data were analyzed by using the factor analysis, descriptive statistics, Pearson's correlation coefficients, and multiple regression analysis. Findings of this study suggested that school leaders had to offer the innovative supports such as innovative equipment and financial support available received from the organization could be a better important influence in boosting up organizational innovation.

**IE Student Education in China and Its Development**

Yu yang[1], Xuedong Liang[1], Geroge L Smith[2], Jing wang[1], Xiaolei Wang[1]
[1]*Chongqing University, China*
[2]*Institute of Industrial Engineers, United States*

The role of China as a world manufacturing center has enhanced the importance of industrial engineering and the attractiveness of an industrial engineering education in China. Based on statistics from Chinese universities with IE departments, IE student education in China including geographic distribution, curriculum, practice teaching, career selection was demonstrated in English for the first time. Initial efforts to promote IE by introducing international IE organizations especially the IIE are presented. Research work is beneficial about how to enhance IE education and improve construction of IE subject with appropriate solution in China.

**Factors Affecting Faculty Members' Integration of Electronic Communication in Teaching**

Murat Durucu[1], Fethi Calisir[1]
[1]*Istanbul Technical University, Turkey*

Our study focused on the relative impact of faculty members' personal characteristics, computer self-efficacy, and attitudes toward the Internet on integration of electronic communication in teaching. By using survey methodology, data collected from 133 faculty members, who are from four different faculties at Istanbul Technical University. This study shows that computer self-efficacy in using the WWW is the only predictor of integration of electronic communication in teaching courses. Furthermore, we found out that computer self-efficacy in using the WWW was related to computer self-efficacy in using computer, computer self-efficacy in using e-mail, and faculty they belong to. The results suggest that these variables need to be considered when planning training programs or differential staffing for reconciling faculty and their integration of electronic communication in teaching courses.

**Students' Experiences of Supervision in Doctoral Education in Industrial Engineering and Management**

Katja Lahenius[1], Miia Martinsuo[2]
[1]*Helsinki University of Technology, Finland*
[2]*Tampere University of Technology, Finland*

This study investigates how doctoral students experience supervision during their studies in one Department of Industrial Engineering and Management, and how different student groups differ from each other in their supervision experiences. The focus of comparison is on part-time vs. full-time students, newcomers vs. old-timers in study stage, and beginners, proceeders and achievers in research progress. Two sets of data were collected for the study: qualitative and quantitative. The results indicate that particularly part-time and full-time doctoral students and students differing in their research progress diverge in their supervision experiences. The results suggest that the flexible supervision system used in the Department is particularly suited for individuals with strong capabilities and ambition.

**Developing On-the-job Training Program for the Occupational Safety and Health Personnel in Nanotechnology Industries**

Fu-man Hsieh[1], Perng-Jy Tsai[2], Wang-Yi Chen[3], Chen-Ping Chang[3]
[1]*Wen-tzao Ursuline College, Taiwan*
[2]*Department of Environmental and Occupational Health, National Cheng Kung University, Taiwan*
[3]*Institute of Occupational Safety and Health, Taiwan*

In the present study, a complete training curriculum was proposed according to the content of occupational health program mandated by the law and job demands of the safety and health personnel, and was finalized by the focus group. The developed training courses include 41 courses in total and could be classified into the four categories of the hazard recognition, hazard evaluation, hazard controls, and environmental management, and three levels of the introductory, advanced and professional level. The needs of proposed courses were assessed from the organization, and person analysis aspects. The training needs obtained from the organization analysis aspect were served as guidelines for adjusting the prioritization of training needs for course of different levels in different categories obtained from the person analysis aspect. As a result, top 11training courses were identified and were recommended for conducting on-the-job training for the safety and hygiene workforce in nanotechnology industries to reduce the incidence of occupational illness.

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| **Session** | Human Factors 1 |
| **Date** | 12/11/2009 |
| **Time** | 09:00 - 10:30 |
| **Room** | Montparnasse I |
| **Chairs** | Rammohan Maikala, Yiren Dong |

**The Expansion of the Partial Differential Equations Models of the ABR System and the Condition of the Communication Process**

Masahiro Aruga[1], Aritho Endo[2], Kiyotaka Takagi[1], Hiroshi Tanaka[2]
[1]*Tokai University, Japan*
[2]*Tokyo Medical and Dental University, Japan*

The ABR characters have been used especially in medical fields. But the ABR detail system is not sufficiently clear. Therefore the studies of the ABR system and the Life Support system have been performed. Especially from such view point as information and communication process the ABR characters are needed to be discussed. In this paper the expanded partial differential equation models of the ABR system are derived and from these characters such a kind of the ABR system model as the information and communication process model is proposed taking account of the concept to be based on the Peirce's Semiotics. And some examples of the method to analyze the ABR system are shown to discuss the background theory of the ABR system from the view point of the information and communication process and improve the Life Support system from the phase of such a theory.

**Usability and Functionality: A Comparison of Project Managers' and Potential Users' Evaluations**

Ayse Elvan Bayraktaroglu[1], Fethi Calisir[1], Cigdem Altin Gumussoy[1]
[1]*Istanbul Technical University, Turkey*

Users tend to use functional and usable products more frequently. It is also possible that a functional software is not usable or vice versa. Only functionality-focused designs fail to meet usability needs [1]. Therefore, both usability and functionality, which in software design are interrelated, should be taken into account in the design processes [2]. In addition, meeting users' requirements is one of predictors of project success. Therefore, there should be a match between the expectations of the users and the perception of the project managers with respect to usability and functionality. The aim of this study is to make a comparison of the project managers' and potential users' evaluations of the relative importance of usability and functionality factors in a software design project. Analytical Network Process (ANP) was used to analyze the relative importance of the factors.

**The Success of the South African Construction Industry in the International Market: Is Diversity an Issue?**

Jose Miranda[1], Marie-Louise Barry[1]
[1]*University of Pretoria, South Africa*

This paper explores research done in South African construction organizations to determine whether the management of diversity is important. The study further identified eleven diversity issues using a literature survey and expert interviews. These issues were rated according to importance and maturity during a two round Delphi study with 33 experts. The four most important diversity factors were found to be: Organizational support and leadership for diversity; Foster individual maturity and ability to embrace diversity; Encourage intercultural understanding and Commit to diversity in organizational vision. South African construction organizations are not yet mature in their management of diversity issues.

**A Pre-alarm System for Visual Fatigue in an IC Packaging Factory**

Jhih-Tsong Lin[1], Guo-Feng Liang[1], Sheue-Ling Hwang[1], Eric Min-yang Wang[1]
[1]*National Tsing Hua University, Taiwan*

Before shipping the product to customer, maintenance is a back-end department of integrated circuit (IC) production, and yield rate measures whether the product batch is accepted or not. A correlation analysis showed a positive relationship between yield rate and visual fatigue, so reducing visual fatigue can improve operators' comfort as well as the yield rate. In this study, Group Method and Data Handling (GMDH) of neural network was applied to build a visual fatigue prediction model which was implemented in the maintenance section of an IC packaging factory. The implementation result showed that visual fatigue was reduced, and yield rate also improved simultaneously.

**An Assessment of a Workload Predictive Model in Manual Materials Handling Tasks**

Kai-Way Li[1], Shang Wei Tseng[1], Rui-feng Yu[2]
[1]*Chung-Hua University, Taiwan*
[2]*Tsinghua University, China*

Eight subjects performed a box handling task for an hour at either once or twice per minute in the laboratory. The task consisted of lifting a box, carrying it for 8.5 m, lowering the box, and then walking 8.5 m back. Four lifting and lowering heights were tested. Oxygen uptake, heart rate, and ratings of perceived exertion for whole body and low back discomfort were measured. Both the actual and predicted energy expenditure for the box handling was determined. The results showed that both frequency and lifting and lowering height affected oxygen uptake, heart rate, and the rating of perceived exertion for whole body significantly ($p<0.05$). The difference between the actual and predicted energy expenditures was, however, not significant.

**Determination of Maximum Acceptable Weight of Handling in Combined Manual Materials Handling Tasks**

Kai-Way Li[1], Chih Fang Liu[1]
[1]*Chung-Hua University, Taiwan*

A study on combined manual materials handling (MMH) tasks performed under three frequencies was conducted. The maximum acceptable weight of handling (MAWH) was determined. The subject then performed the same tasks for 10 minutes. The VO2, heart rate, and rating of perceived exertion for whole body strain were measured. The results showed that the effects of frequency on the MAWH, heart rate, and Vo2 were statistically significant ($p<0.01$). The implication of this study was that frequency should be regarded as one of the major factors in designing MMH tasks as it affected both physiological responses of the subjects.

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| **Session** | Human Factors 2 |
| **Date** | 12/11/2009 |
| **Time** | 11:00 - 12:30 |
| **Room** | Montparnasse I |
| **Chairs** | Masahiro Aruga, Ravindra Goonetilleke |

**Ergonomics Solutions for Improving Surgery Performance of Interlocking Intramedullary Nails**

Shaolong Kuang[1], Tianmiao Wang[1], Lei Hu[1], Wenyong Liu[1], Junqiang Wang[2]
[1]*Beihang University, China*
[2]*Jishuitan Hospital, China*

High ratio adverse events in surgery of interlocking intramedullary nails (IINs), especially in the distal locking operation have been the major issues troubling the surgeons. An ergonomics method which is the HTA method based on the SRK mode is proposed to improve the performance of IINs, and a seven-step procedure of this method is adopt to carry out the analysis. Two parameters which are the requirements of surgeon's cognitive levels and the safety of patients are selected as the index for analysis the IINs' performance. Then a computer assisted aiming device is designed by using this method to achieve the performance goals. The experimental results show that the ergonomics solutions we proposed are feasible for these issues.

**Role of Floor Frictional Characteristics and Gender on Psychophysiological Responses During Dynamic Pushing**

Rammohan Maikala[1], Vincent Ciriello[1], Patrick Dempsey[1], Niall O'Brien[1]
[1]*Liberty Mutual Research Institute for Safety, United States*

We evaluated maximum acceptable forces and physiological responses simultaneously in 12 men and 15 women workers while dynamic pushing. First, a psychophysical approach was utilized to identify participants' maximum acceptable forces to be pushed on 3 surfaces: Treadmill belt; Plywood floor; and Teflon floor. Second, while pushing for two hours at their psychophysically chosen force, cardiopulmonary and calf muscle oxygen saturation were collected. In both men and women, higher whole-body oxygen uptake per force coupled with increased muscle oxygen saturation per force on Teflon floor were observed, suggesting that pushing on the slippery Teflon floor is metabolically more challenging for all workers than on other surfaces. Interestingly, the muscle oxygen saturation-force ratio in women was higher compared with men on Treadmill (by 29%), on Teflon (by 30%), and on Plywood floor (by 72%). These findings suggest the strong influence of force exertion on muscle oxygen saturation in women versus men.

**Crew Resource Management Training for Improving Team Performance of Operators in Korean Advanced Nuclear Power Plant**

Sa-Kil Kim[1], Je-Yun Park[1], Seong Nam Byun[2]
[1]*Koera Atomic Energy Research Institute, South Korea*
[2]*Kyung Hee University, South Korea*

The Nuclear power plant (NPP) industries in Korea have been making efforts to reduce the human errors which largely contributed to 120 nuclear reactor trips from the year of 2001 to 2006. This study aims to develop a Crew Resource Management (CRM) training program that helps to improve plant performance by reducing the number of the reactor trips caused by the operators' errors.
The CRM program was developed with focusing on non-technical skills, such as leadership, situation awareness, teamwork, and communication, which have been widely known to be critical for improving the operational performance. In this study, the CRM program was applied to the operators performing simulation scenarios in the mockup of the main control room of the APR-1400. The CRM program was preceded with the lectures, emergency operation procedure scenarios designed by the process expert, task monitoring, and debriefings. Finally we verified the effectiveness of CRM training through the attitudes test and BARS(Behaviorally Anchored Rating Scale) to measure learning that has resulted from participation in the training program. The implication of the evaluation results was discussed in detail.

**An Affective-Cognitive Framework of Product Ecosystem Design**

Feng Zhou[1], Roger Jiao[2], Qianli Xu[1], Songlin Chen[1], Xingda Qu[1], Martin Helander[1]
[1]*Nanyang Technological University, Singapore*
[2]*Georgia Institute of Technology, United States*

Companies have been constantly confronting the challenge of designing products for a totality of user experience, both affectively pleasurable with optimal intensity and cognitively convenient with appropriate intuition. It becomes more common that consumer products turn to be correlated with one another, in conjunction with services, use environments, along with many use context-related factors. This leads to a scenario of product ecosystem design. This paper is directed toward modeling user experience for product ecosystem, involving examination of its surrounding ambient factors and human-product-ambience interactions. The affective-cognitive aspects of product ecosystem design are highlighted due to their importance of forming user experience. A framework of product ecosystem is developed to incorporate the affective-cognitive aspects. A case example of truck cabs is also presented to illustrate the concept of product ecosystems.

**A Research on the Mechanism of Leveraging Innovation Capabilities Via Entrepreneurs in SMEs**

Suping Zhang[1], Qingrui Xu[1]
[1]*Zhejiang University, China*

Entrepreneurs as the most important drivers, determine the whole enterprise's innovation capabilities in Small and Medium-sized Enterprises (SMEs). Existing literatures concerned the relationship between innovation capabilities and entrepreneurs, consistently emphasize the important role of entrepreneurs; yet they do not clarify the question of "how"----how entrepreneurs leverage the innovation capabilities. However, the answer of "how" has more practical significance than just expounding the important role of entrepreneurs in enhancing innovation capabilities.
In this article, two paths by which entrepreneurs leverage innovation capabilities are explored. One is direct; referring that entrepreneur should strengthen himself. The other is a relatively indirect one, nurturing employees to leverage the whole enterprise's innovation capabilities. A case study of the innovation capability development at UPG, a small financial service company in Zhejiang Province, found the mechanism how entrepreneurs leverage innovation capabilities.

**Adaptability of Reward System for Knowledge-Based Competition**

Shujuan Zhang[1], Wei Shi[1], Xuan Wang[1], G.Q. Liang[1]
[1]*North-western Polytechnical University, China*

Traditional organizations were not designed with an eye to knowledge management. The reward systems in these organizations were designed and structured to support this organizational logic. Knowledge-based approaches to competitive advantage require organizational behavior that is very different. Analyzing the job-based pay, skill-based pay and performance-based pay, this paper discussed the advantages, disadvantages and the adaptability of them in knowledge-based organizations. Several kinds of pay systems that will have positive impact on in knowledge-based organizations were pointed out.

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| **Session** | Systems Modeling and Simulation 1 |
| **Date** | 12/11/2009 |
| **Time** | 09:00 - 10:30 |
| **Room** | Montparnasse II |
| **Chairs** | Egon Mueller, Adam Ng |

**Decision Making for Interactive Optimization of Correlated Desirability Functions**
Mahdi Bashiri[1], Ali Salmasnia[1]
[1]*Shahed University, Iran*

Optimizing multi-response problems has become an increasingly relevant issue when more than one correlated product quality characteristic must be assessed simultaneously in a complicated manufacturing process. This study proposes new interactive multi criteria method for determining the best levels of the decision variables needed to simultaneously optimization of response variables. Initially principal component analysis (PCA) is conducted on the response values to obtain a set of uncorrelated component. Then, we obtain initial design solution by solving model which aims to identify control variables which minimizes maximal deviation of the normalized mean and the standard deviation of all the responses from their target values within the experimental region. In next step, the desirability functions of principal components are maximized using G-D-F algorithm. Finally optimal step size is obtained from technique for order preference by similarity to ideal solution (TOPSIS) and then if the new solution is not satisfactory this solution is improved by repeating algorithm.

**A Design Process for Texture Segmentation**
Hee Kooi Khoo[1], Hong Choon Ong[1]
[1]*Universiti Sains Malaysia, Malaysia*

Classification technique has become the necessary tool to detect products which has texture patterns in machine vision. The design used for the process of texture discrimination is critical to the performance of the outcome. In this study we propose a design process model which can systematically maintain and improve on the performance of texture segmentation in terms of speed and segmentation accuracy. The overall accuracy and time tested for the synthetic textures segmentation has shown significant improvements throughout the parameters tuning of the chosen methods.

**An Automated Approach for Identification and Resolution of Spatial Clashes in Building Design**
Andreas Radke[1], Toste Wallmark[2], Mitchell Tseng[1]
[1]*Hong Kong University of Science and Technology, Hong Kong*
[2]*Tecton Limited, Hong Kong*

Designing a building is a complex task involving specialists from different domains. The current method of overlaying 2D Independent Services Drawings (ISD) to identify collisions between building services and structural framing is prone to errors, causing ad-hoc rework, and reduced headroom and maintainability issues.
While solutions to resolve collisions spatially in software exist, most of them are based on tessellated mesh representations approximating the geometry of the design objects. This approach is memory and computation-intensive. Furthermore, it can neither identify all possible clashes nor solve clashes reliably.
This paper outlines a clash identification and resolution approach based on the original design parameters of the objects which requires less computations, is more accurate, and can identify all object collisions. It allows the extension to automatic resolution.
This approach has been implemented in a prototype system based on Revit MEP 2009. A case study is shown here to illustrate its feasibility.

**Integrating Human Behaviour into Factory Simulation - A Feasibility Study**
Ralph Riedel[1], Egon Mueller[1], Ruediger von der Weth[2], Noah Pflugradt[1]
[1]*Chemnitz University of Technology, Germany*
[2]*University of Applied Sciences Dresden, Germany*

As the environment of manufacturing enterprises is becoming more complex and dynamic this requires powerful tools for the support of decisions in manufacturing and production planning. Simulation as one of those tools has been widely applied in manufacturing and logistics. However, the models used for simulation are incomplete because the human factor in terms of its decision making and behaviour is considered only rudimentary. This leads to sub-optimal decisions and to a gap when implementing solutions in practice. The paper presents an approach for enriching the common (technical) simulation models with need controlled human agents. The agent is based on a formalised motivation theory. In a feasibility study several typical settings, like ramp up curves and learning effects, were tested. The approach is unique in the field of simulation with a big potential for higher quality in analysing and designing production systems.

**Design of Experiments for Simulation Models with Stochastic Constraints**
Shi Mu[1], Jun Yin[1], Jun Yuan[1], Szu Hui Ng[1]
[1]*National University of Singapore, Singapore*

Design of experiments is often used to better understand or improve the output measures of a simulation model. Traditional cuboidal and spherical designs have been effective when the factor input regions are known. However, often in practice, simulation models have additional stochastic constraints causing the input factor space to be restricted and irregularly shaped. This paper looks into several alternative designs in a two stage approach to study these models in the constrained regions. This approach is then applied to a (s,S) inventory simulation.

**Intelligent Agents Behavior in the Queueing Process: Integrating Cellular Automata & Genetic Algorithms**
Karthik Sankaranarayanan[1], Erik R Larsen[1], Ann Van Ackere[2]
[1]*University of Lugano, Switzerland*
[2]*University of Lausanne, Switzerland*

Traditional queueing research has concentrated mainly on design, performance and running of the service facility with customers arriving following a stochastic process. In this paper we develop a behavioral model of a queueing system including repeat (returning) customers using a combination of Cellular Automata models (CA) and Genetic Algorithms (GA). An agent based evolutionary approach using simulation is adopted where agents' structural properties are defined using a CA and evolutionary strategies are implemented with the help of a GA.

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| **Session** | Systems Modeling and Simulation 2 |
| **Date** | 12/11/2009 |
| **Time** | 11:00 - 12:30 |
| **Room** | Montparnasse II |
| **Chairs** | Thong Ngee Goh, Ralph Riedel |

**Creating a Simulation Environment for Critical Infrastructure Interdependencies Study**
Irene Eusgeld[1], Cen Nan[1]
[1]*Swiss Federal University of Technology Zurich, Switzerland*

The critical infrastructures (CIs) on which our daily life depends are mutually interdependent. What happens to one infrastructure can directly or indirectly affect another infrastructure or maybe even more. The development of advanced techniques of modeling and simulation is significant for the interdependencies study between CIs. In this paper, an approach to model critical infrastructures as well as using HLA (High Level Architecture) to simulate the interoperations between individual models under system-of-systems design architecture is proposed. Two examples of interdependent systems (CIs), which are studied in this approach, are : Electric Power Supply (EPS) System and Supervisory Control and Data Acquisition (SCADA) System.

**Optimizing Wheat Storage and Transportation System Using a Mixed Integer Programming Model and Genetic Algorithm: A Case Study**
Reza Zanjirani Farahani[1], Nasrin Asgari[1], Hossein Hojabri[2], Amir Ardestani Jaafari[2]
[1]*National University of Singapore, Singapore*
[2]*Amirkabir University of Technology, Iran*

The investigated case is a vast country with a variety of climates. Due to this diversity in climate and therefore different farming conditions in different areas of the country, wheat is produced at different times of year all over the country. Therefore, wheat production rate is not constant during year all around the country. Lack of balance between wheat production and consumption in different provinces during different periods necessitates storage and transportation of wheat. In this paper, we intend to find the answer to the following question: "How much wheat in each month of year must be transported from each province to other provinces?" A mixed integer programming (MIP) model is developed for the problem and a genetic algorithm (GA) is designed since optimization solvers cannot solve the real-size problem in an acceptable time. To prove efficiency, GA results are compared with those of LINGO 8.00 for small-sized test instances.

**System Dynamics Simulation and Optimization with Fuzzy Logic**
Adam T.S. Ng[1], Muhammad Iqbal Bin Khirudeen[1], Tony Halim[2], Sie Yong Chia[2]
[1]*National University of Singapore, Singapore*
[2]*Temasek Polytechnic, Singapore*

This paper presents a novel and practical approach for integrating simulation and optimization of system dynamics (SD) models using Matlab and Simulink. The Matlab platform allows much freedom in customizing and implementing global search techniques such as genetic algorithms (GA) and artificial intelligence constructs like fuzzy logic. The Simulink platform allows complex nonlinear dynamic models to be specified rapidly. In this work we demonstrate how to combine the GA parameter search, fuzzy logic expert input and SD modeling to arrive at better strategies for decision making. This approach to optimization is illustrated using the classical market growth- model and produces very competitive good results.

**Chaotic vs. Random Coverage Missions**
Felix Hackbarth[1]
[1]*Hamburg University of Technology, Germany*

This paper presents a new approach on how to use the specific properties of chaotic attractors for the coordination of mobile robots. The specific properties of a chaotic system used here are the exponential divergence on the attractor and the attractor itself. On chaotic attractors the trajectories diverge exponentially, but stay within the limits of the attractor. The state space of the chaotic attractor is projected to the mission space of the robots. The divergence is appropriate to a fast distribution of the robots in an area. After a leading divergence the average distance between the robots stays nearly constant. Taking the attractor coverage time it is shown that the proposed chaotic movement for small discretization is in principle superior to random movement.

**Global Bifurcations for a Rotor-Active Magnetic Bearings System**
Hongzhi Tong[1], Fenghong Yang[2], Lihua Chen[3]
[1]*University of International Business and Economics, China*
[2]*Central University of Finance and Economics, China*
[3]*Beijing University of Technology, China*

In this paper, the global bifurcation for a rotor-active magnetic bearings (AMB) system with the time-varying stiffness is investigated through discussing the zeros of the Melnikov function. Some critical conditions of chaos occurring are given. According to the results, the case that the order of Melnikov function is more than or equal to 2 is more general than other case (no zero or simple zero). In other word, homoclinic tangency may occur in several resonance relations.

**Intelligence and Impact Contests in Defending a Single Object with Imperfect False Targets**
Rui Peng[1], Gregory Levitin[2], Min Xie[1], Szu Hui Ng[1]
[1]*National University of Singapore, Singapore*
[2]*The Israel Electric Corporation Ltd., Israel*

Introducing false targets is a common approach to protect important facilities. In this paper we assume that the defender has deployed a single object that can be destroyed by the attacker and deployed several false targets in order to misinform the attacker. The false targets are imperfect and can be detected by the attacker independently. In order to detect the false targets the attacker allocates part of his budget into intelligence actions. The optimal resource distribution between target identification/disinformation and attack/ protection efforts is studied for the case of constrained defense and attack resources.

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| **Session** | Safety, Security and Risk Management 1 |
| **Date** | 12/11/2009 |
| **Time** | 09:00 - 10:30 |
| **Room** | Montparnasse III |
| **Chairs** | Assed Haddad, Min Wang |

**Developing a Scale Measurement of Market Uncertainty: A Cluster Analysis on Taiwan's Financial Services**
Shu-Hsien Liao[1], Wen-Jung Chang[1], Da Chian Hu[1], Yi-Wen Lin[1]
[1]*Tamkang University, Taiwan*

The way to ensure a company's long-term advantages for survival is to completely know market uncertainty. Though the financial services have been made great contributions to Taiwan's economic development, past research pays little attention on them without a scale development of market uncertainty. Building on extensive literature, a 53-item survey questionnaire was developed and 323 respondents from 28 domestic financial services were selected as the sample of this study. Using an exploratory factor analysis (EFA), we would retrieve four dimensions of market uncertainty, including market situation, market forecasting, market innovation and competitor's threats. Meanwhile, we would divide market uncertainty into three groups by cluster analysis and further verify them with business performance as well as project efficiency.

**Risk Simulation for Residential Development: A Case Study for an Uncertain Market in South Africa**
Leon Pretorius[1], Changhua Li[2]
[1]*University of Pretoria, South Africa*
[2]*Hefei University, China*

Risk assessment (RA) can be considered to be a sub-system of risk management (RM). Some socio-economic aspects of creating uncertainty in a residential development in a South African case study are discussed within a systems context. The cultural dimension creating uncertainty in the residential development undertaken by a Chinese company in South Africa is also explored. Conceptual risk simulation using the Monte Carlo method is presented to assess the effect of interest fluctuations on the development.

**Stock Indices Analysis Based on ARMA-GARCH Model**
Weiqiang Wang[1], Ying Guo[1], Zhendong Niu[1], Yujuan Cao[1]
[1]*Beijing Institute of Technology, China*

The generalized autoregressive conditional heteroskedasticity (GARCH) model has become the most popular choice in the analysis of time series datas. In this paper, an autoregressive moving average （ARMA）-GARCH model was built, and it also provided parameter estimation，diagnostic checking procedures to model, and predict Dow and S&P 500 indices data from 1988 to 2008,which extracted from yahoo website, and also compared with the GARCH conventional model, experimental results with both two data sets indicated that this model can be an effective way in financial area.

**Case-based HFACS for Collecting, Classifying and Analyzing Human Errors in Marine Accidents**
Yongtao Xi[1], Quangen Fang[1], Weijiong Chen[2], Shenping Hu[1]
[1]*Shanghai Maritime University, China*
[2]*Library of Shanghai Maritime University, China*

Despite the modernization and automation in marine technology and the implementation of safety-related regulations, marine accidents are still a main concern for global maritime transportation. It is well known that human error is the key contributor, but human error data is hard to be collected and classified and the factors which influence human behavior should be identified. For this reason, the goal of this paper constructed a case-based HFACS (Human Factor Analysis and Classification System) method for marine human factor data collection and classification, and the data collected produced statics for analysis and safety management.

**Cultural Backgrounds of Employees' Safety Behaviors: Coding and Cluster Analysis on Participant Observation**
Qi Zhang[1], Guangtao Yu[2], Erping Wang[1]
[1]*Research Institute, China*
[2]*University, China*

Safety culture is a social control power in hazardous industrial systems. This study aims to explore the characteristics of safety culture in China. The 128 behavior incidents of employees' routine work were gained through 103 days' participant observation in a state owned petrochemical plant. Cluster analysis was conducted on the selected 109 incidents, and finally assembling them into 4 categories according to five conceptual bipolar variables. Results indicated that: (1) Stern management is not able to control employees' safety behaviors; (2) Employees usually behave conforming to the norm formed by the working group and judge things according to the situation; (3) Employees' abidance of rules depends on different conditions; and (4) Authority's power is also a factor to safety behaviors. Although it works in certain tense, it cannot bring effective influence to the behaviors, attitudes, and beliefs of employees.

**A Comparison of Friction Measurement Results Using Two Slipmeters**
Kai-Way Li[1], Ching-Sui Hung[1]
[1]*Chung-Hua University, Taiwan*

Assessment of floor slip slipperiness is of paramount importance in quantifying the risk of slipping and falling incidents. Friction measurement is one of the major approaches in assessing floor slipperiness. The Brungraber Mark II is one of the slipmeters commonly used in the USA. Operation of the Mark II requires repetitive strikes of the footwear pad on the floor for a single reading. One of the disadvantages of the Mark II is that the operator needs to lift a 4.54 kg weight and releases it with an awkward kneeing posture for every trial. To remedy this drawback, the designer of Mark II has fabricated a new slipmeter named Mark III. Instead of been driven by a 4.54 kg weight, the Mark III is activated by a spring. This requires less physical effort in both carrying and operating as compared to that of the Mark II. However, there is no published data examining the reliability and consistency of this new device. In this study, we compare the friction measurement results of the two slipmeters under four floors, four footwear materials, and three surface conditions.

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| **Session** | Safety, Security and Risk Management 2 |
| **Date** | 12/11/2009 |
| **Time** | 11:00 - 12:30 |
| **Room** | Montparnasse III |
| **Chairs** | Leon Pretorius, Qingpei Hu |

**Reviving Knowledge and Preventing Accidents in Process Industries**

Patrizia Agnello[1], Silvia Ansaldi[1], Paolo Bragatto[1], Paolo Pittiglio[1]
[1]*ISPESL Nat.Inst.Prevention & Safety at Work, Italy*

In process industries, safety knowledge is well defined and formalized. The safety management systems, is the internal safety knowledge repository. In these industries the most accidents do not happen because a lack of knowledge, but because it has been forgotten, or misunderstood, by the operators. In plant operation, even though hazards are accurately identified and analyzed, failures, deviation, losses and other unexpected events are much more usual than accidents. These events, even without consequences, are essential for the safety management, as they may reveal the disruptions in practical operator knowledge. A knowledge management model is proposed to revive the operational knowledge. The model has been implemented by means of advanced information management tools and applied in a industrial facility.

**Quantitative Risk Analysis Applied to the Gases Industry**

Assed Haddad[1], Thaisa Sá[1], Erick Galante[2]
[1]*Federal University of Rio de Janeiro, Brazil*
[2]*Brazilian Army, Brazil*

In order to contribute to the risk knowledge that people and the environment can suffer from accidents related to process safety this paper presents a case study of Quantitative Risk Analysis applied to the Gases Industry. Industry activities such as production, storage or handling related to dangerous materials are complex and highly prone to severe or catastrophic accidents. All these happen not only because of major accidents occurrence, society pressure, law compliance and because of the growing care about the environmental sustainability by companies and their stakeholders. We address the importance of managing risk and present usual methods of qualitative and quantitative risk analysis studies. Such combination make possible analyze the feasibility of an industrial venture. Developing a case study for the process of cooling with ammonia in GASMIL, performing a risk analysis, through vulnerability analysis and knowledge of these subjects, one can map affected areas by the accidental scenarios.

**On the Anatomy of Operational Risk**

Amerigo Silvestri[1], Enrico Cagno[1], Paolo Trucco[1]
[1]*Politecnico Di Milano, Italy*

The paper aims to contribute to the improvement of all the phases of the risk management process, enlarging the traditional description of cause-effect mechanisms (called "pathology" based risk analysis) with some "inherent" characteristics of operational risk that could impact on the organizations core capabilities (called "anatomy" based risk analysis). After the proposal of a new operational risk definition, the paper describes the anatomy modelling of operational risk. A case study in project-based operations will be used to qualitatively compare the advantages of the anatomy-based approach with respect to the pathology approach, within the entire enterprise risk management process.

**Safety Culture in Petrochemical Companies in Brazil**

Anastacio Pinto Goncalves Filho[1], Jose Celio Silveira Andrade[2], Marcia Mara Oliveira Marinho[2]
[1]*Ministry of Labour and Employment, Brazil*
[2]*Bahia Federal Universtiy, Brazil*

A framework to measure safety culture maturity in Brazilian petrochemical companies was formulated. A questionnaire was designed to measure 5 aspects of organizational safety indicative of 5 levels of cultural maturity in Brazilian industry. The questionnaire was completed by the safety managers of 23 petrochemical companies based in Camacari, Brazil. The reliability of the questionnaire was tested by asking the same questions in an interview and comparing the results (alternate-forms reliability). The correlation coefficients between the questionnaire and interview scores on each dimension ranged from r= 0.7 - 0.9, demonstrating good reliability of the measures used. The research findings demonstrated that the companies studied showed characteristics of different levels of safety culture. The framework was found to be practical to use, making it possible to identify levels of safety culture maturity in the context of the Brazilian petrochemical industry.

**STARTS: A Decision Support Architecture for Dynamic Security Configuration Management**

Anand Singh[1], David Lilja[1]
[1]*University of Minnesota, United States*

Configuration of security controls is either static or event driven (such as an incident or in response to recommendations from a risk assessment exercise) in most organizations. These approaches do not adequately protect the organization because threats to information are ever changing and dynamic in nature. STARTS is a decision support architecture for dynamic security management developed at the University of Minnesota. It is the first security architecture that proposes the use of statistical design of experiments technique for dynamic security configuration adjustment. This is accomplished through ongoing statistical analysis using control sensors. These sensors collaborate with each other on an ongoing basis via a Plackett-Burman matrix and generate recommendations on the adjustments that need to take place in the security configuration to respond to changing threats. In this paper, we describe the STARTS architecture as well as the results from its preliminary implementation.

**Application of Formal Safety Assessment Methodology on Traffic Risks in Coastal Waters & Harbors of Fujian Province**

Jinpeng Zhang[1], Shenping Hu[1]
[1]*Shanghai Maritime University, China*

Formal safety assessment (FSA) is a systematic formal and integrated assessment approach and has various applications to many fields. In this paper, FSA methodology is applied to traffic risk assessment in Fujian coastal waters and harbors, among of which traffic risks are quantified by means of concept of relative risks. From FSA analysis, we conclude that ship collision and contact take the first place among accidents, while the consequences of accidents occurred in typhoon and fog seasons are the most serious. As to accident causes, seafarers and natural conditions make the most important contribution to accident occurrence, and small boats are involved in accidents most frequently. Thus, such targeted proposals are provided finally as the implementation of grid management, focus on seafarer training and management of small shipping companies, etc.

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| **Session** | E-Business and E-Commerce 1 |
| **Date** | 12/11/2009 |
| **Time** | 09:00 - 10:30 |
| **Room** | Montparnasse IV |
| **Chairs** | Lisheng Wang, Ilias Santouridis |

**Robust Segmentation for the Service Industry Using Kernel Induced Fuzzy Clustering Techniques**
Chih Wang[1]
[1]*National Chung Hsing University, Taiwan*

To understand customers' characteristics and their desire is critical for modern CRM (customer relationship management). The easiest way for a company to achieve this goal is to target their customers and then to serve them through providing a variety of personalized and satisfactory goods or service. In order to put the right products or services and allocate resources to specific targeted groups, many CRM researchers and/or practitioners attempt to provide a variety of ways for effective customer segmentation. Unfortunately, most existing approaches are vulnerable to outliers in practice and hence segmentation results may be dissatisfactory or seriously biased. In this study, a hybrid approach that incorporates kernel induced fuzzy clustering techniques is proposed to overcome the above-mentioned difficulties. Two real datasets, including the supervised WINE and the unsupervised RFM, are used to validate the proposed approach. Experimental results show that the proposed approach cannot only fulfill robust classification, but also achieve robust segmentation simultaneously.

**Research on the Relationship Between Customer Value of E-business and Customer Retention: An Empirical in China**
Guozheng Zhang[1], Xiaohong Chen[1], Faming Zhou[2]
[1]*Central South University, China*
[2]*Hunan Agricultural University, China*

The Internet represents a fundamentally different environment for businesses. It opens up the industry to increased competition and, as a result, reduces the likelihood of businesses retaining customers in the long run. So, it is important to analyze the relationship between customer values and customer retention in order to provide a guideline of successful e-business. The purpose of this paper is to answer the following questions. First, what are key components of customer value in e-business? Second, what influences the relationship between customer value and customer retention? Data collected from 520 respondents who made purchases through Internet shop were used to test a research model. Several managerial implications were derived from the analysis and further studies were suggested.

**The Relationships among Brand Image, Brand Trust, and Online Word-of-Mouth: an Example of Online Gaming**
Shu-Hsien Liao[1], Yu-Chun Chung[1], R. Widowati[1]
[1]*Tamkang University, Taiwan*

This study mainly investigates the relationships among brand image, brand trust, and online word-of-mouth. The present study collects 317 players of the online game "World of Warcraft" to empirically investigate the relationships among brand image, brand trust, and online word-of-mouth, and examines the moderating effect of experience. By manipulating structural equation modeling (SEM), the research results indicate that brand trust serves as a partial mediator between brand image and online word-of-mouth. The other findings specify the substantial moderating effect of experience in brand image, brand trust, and online word-of-mouth.

**Analysis of Capacity-Constrained Sequential Auctions in Duopoly Market Environment**
Z. Zhang[1], Mingzhou Jin[1]
[1]*Mississippi State University, United States*

Sequential auctions with the Vickrey-Clarke-Glove (VCG) mechanism are proposed for two buyers to purchase multiple units of an identical item. The suppliers in a duopoly market environment are assumed to have capacity constraints of providing the required product. Three research problems are studied: the suppliers' expected payoff functions, the suppliers' bidding strategies in the first auction, and the buyers' procurement costs. Both suppliers' dominant bidding strategies are theoretically derived. Suppliers' expected profits and buyers' expected procurement costs are empirically analyzed.

**Analysis of Interoperability Value Proposition in the Architectural, Engineering and Construction Sector**
Antonio Grilo[1], Ricardo Jardim-Goncalves[1], Virgilio Cruz-Machado[1]
[1]*FCT-UNL, Portugal*

Whilst the lack of interoperability between companies has been a problem for sometime, today with the increasing pervasiveness of ICT applications in all companies' function the problem is becoming more acute. Organizations operating for the AEC sector are not an exception. This paper presents a model for value proposition suitable to measure the impact of interoperability at enterprise level. A specific analysis of actual and potential value of interoperability in the AEC sector is conducted on interoperability interaction types, as communications, coordination, cooperation, collaboration and channel.

**The Relationship Between ERP Software Selection Criteria and ERP Success**
Wen-Hsien Tsai[1], Pei-Ling Lee[1], Yu-Shan Shen[1], Ching-Chien Yang[2]
[1]*National Central University, Taiwan*
[2]*ChungChou Institute of Technology, Taiwan*

"ERP success" measures are the most important, but they cannot be analyzed and understood without "software quality" and "information quality" measurements. Moreover, high software quality is an essential requirement in an ERP system. And, it will further influence information quality and ERP success. Consequently, the determination of ERP software selection criteria for ERP success plays an important role while organizations consider implementing an ERP system. This study presents a conceptual framework to investigate how ERP software selection criterion are linked to software quality, information quality and ERP success in the ERP implementing process, as well as, the impacts of those factors on software quality.

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| **Session** | E-Business and E-Commerce 2 |
| **Date** | 12/11/2009 |
| **Time** | 11:00 - 12:30 |
| **Room** | Montparnasse IV |
| **Chairs** | Chih Wang, Antonio Grilo |

**Investigating the Mediation Effect of Satisfaction on the Service Quality and Customer Loyalty Link: Empirical Evidence from Greek Customers of Internet Shops**

Ilias Santouridis[1], Panagiotis Trivellas[1]
[1]*Technological Education Institute of Larissa, Greece*

This study aims to provide empirical evidence on the role of service quality and customer satisfaction as predictors of loyalty of internet shoppers in Greece. Furthermore, the possible mediation effect of customer satisfaction on the service quality and customer loyalty relationship is also examined. Service quality is conceptualized by 5 dimensions: ease of use, e-scape, customization, responsiveness and assurance. The statistical analysis showed that service quality is major direct predictor of loyalty, since 4 of its dimensions, with the exception of e-scape, were found to significantly influence loyalty. Moreover, satisfaction was found to have a strong positive impact on loyalty by totally mediating the influence of all the 4 service quality dimensions, which were found to affect loyalty directly.

**An Empirical Study of the Effect of Customer Satisfaction and Its Two Dimensions on Online Customer Loyalty**

Qing-hua Zhai[1], Ming-hai Ye[1]
[1]*Tongji University, China*

This paper focused on the building of customer loyalty model. Structural equation model has shown that both product satisfaction and service satisfaction have positive effect on customer satisfaction; the latter one also has positive effect on customer loyalty. Then this paper analyzed the reason of insignificant effect of product satisfaction and customer satisfaction on customer loyalty. Last, the author came up with four suggestions on improvement of customer loyalty in internet environment, to provide scientific, empirical evidence on promoting the development of online shopping.

**Online Customization for Apparel: the Roles of Involvement and Innovativeness**

Yun Wang[1], Chenyin liu[2]
[1]*National Pingtung University of Science and Technology, Taiwan*
[2]*I-Shou University, Taiwan*

Online customization is a powerful marketing strategy, however, customers' attitudes toward acceptance of online customization and behavioral intention to use play a critical success factor. Based on Technology Acceptance Model (TAM) this study examined the relationships among consumers' beliefs, attitudes and intentions toward online customization for apparel. We also explored the moderating effects of individual traits, involvement and innovativeness, in this specific context. According to customers' perception two important moderating effects were found. One was that the higher involvement, the stronger relationship between perceived usefulness and attitude toward acceptance of online customization. The other was that the higher innovativeness, the stronger relationship between attitude toward acceptance of online customization and behavioral intention to use. In practice the results of this study provide firms to understand their target segmentation and to adjust their e-commerce strategies.

**Examining the Factors Associated with Consumer's Trust in the Context of Business-to-Consumer E-Commerce**

Kim Dung Phung[1], Kuei-Ling Yen[2], Ming- Hsiung Hsiao[1]
[1]*Shu-Te University, Taiwan*
[2]*National Sun Yat-sen University, Taiwan*

The purpose of this study is to examine the influence of antecedents on consumer's trust in online companies. Specifically, it aims to examine the relationship between perceptions about the company (including perceived size and perceived reputation) as well as perceptions about the web site quality (including system quality, information quality, and service quality) on consumer's trust in online company, and then on purchase intention. Results of these studies demonstrated that customer's trust in the online company is an important determinant of customer intention to purchase. Furthermore, the results confirmed that perceived size and website quality (including system quality, information quality, and service quality) were the principal determinant influencing consumer's trust in online company. Future, our study results could suggest practitioners can use these results as guidelines in website development, daily operations, and customer support processes in online business.

**An Empirical Research on the Relationship between Perceived Customer Value and E-loyalty**

Lisheng Wang[1], Shao-bo Sun[1], Jinxiang Zha[2]
[1]*Shandong University, China*
[2]*Zhejiang University, China*

This study developed and empirically tested a model examining the relationship between perceived customer value of e-retailers and its impact on e-loyalty intention toward e-retailers. We measure customer value of e-retailers in three dimensions: functional value, process value, and social value. Confirmatory Factor Analysis (CFA) was performed to examine the reliability and validity of the measurement model, and the structural equation modeling techniques were used to evaluate the casual model. Based on a survey in China, this study showed that functional value, process value, and social value were all very important in generating customer loyalty intention toward an e-retailer. The conclusion also showed that website design characteristic and social evading value, product quality, convenience, internet security, customization, internet interactivity, operation simplicity, website brand and C2C relationship value were the significant influential factor of e-loyalty intention toward the e-retailers.

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| **Session** | Decision Analysis and Methods 5 |
| **Date** | 12/11/2009 |
| **Time** | 09:00 - 10:30 |
| **Room** | Montparnasse V |
| **Chairs** | Bertrand Mareschal, Huan-Min Xu |

**Application of Multiple Criteria Decision Analysis in Impact Assessment of Carbon Labelling**
Dong-Ling Xu[1]
[1]*The University of Manchester, United Kingdom*

In this paper, it is described how multiple criteria decision analysis (MCDA) methods, in particular the Evidential Reasoning (ER) approach, is applied to help Tesco, the largest UK retailer, to prioritise product groups for its carbon labelling program. The main objectives of the program are to maximise the positive impact of the program to the environment in terms of carbon footprint reduction, while not to introduce unintentionally non-carbon related risks such as resource depletion, pollution and ethical risks. The application is focused on comparing both the positive and negative impacts of labelling different product groups so that the ones with the relatively higher positive impacts are recommended for early participation in the program. The main challenges of the application are uncertainties in data and judgements, such as lack of data, inaccuracy of data estimates and weights of different criteria. It is demonstrated with examples how those challenges can be dealt with by applying the ER approach for MCDA.

**Incomplete Pairwise Comparison Matrices in Multi-Attribute Decision Making**
Sándor Bozóki[1], János Fülöp[1], Lajos Rónyai[1]
[1]*MTA SZTAKI, Hungary*

An extension of the pairwise comparison matrix is considered when some comparisons are missing. A generalization of the Eigenvector Method for the incomplete case is introduced and discussed as well as of the Logarithmic Least Squares Method. The uniqueness problem regarding both weighting methods is studied through the graph representation of pairwise comparison matrices. It is shown that the optimal completion/solution is unique if and only if the graph associated with the incomplete pairwise comparison matrix is connected. An algorithm is proposed for solving the eigenvalue minimization problem related to the generalization of the eigenvector method in the incomplete case. Numerical examples are presented for illustration of the methods discussed in the paper.

**A Decision Making Software for End-of-Life Vehicle Disassemblability and Recyclability Analysis**
Feri Afrinaldi[1], Muhamad Zameri Mat Saman[2], Awaluddin Mohamed Shaharoun[2]
[1]*Andalas University, Indonesia*
[2]*Universiti Teknologi Malaysia, Malaysia*

Currently, many countries have developed new legislations which are aimed at greater emphasis to force motor vehicle manufacturers to recycle their products at the end of their life. However, before end-of-life vehicles can be recycled, the end-of-life disassembly needs to be in placed. It entails large amounts of capital expenditure and time. Most manufacturers would not like to even considering disassembling and recycling the end-of-life vehicles unless costs are justified and financial gains assured. Therefore, there is a strong need for the software to evaluate the disassemblability and recyclability aspect of the end-of-life vehicles and to determine its technological and economic impact. This paper presents the software to fulfill the above needs. The software is expected to show how economically efficient is it to disassemble end-of-life vehicles and check the opportunity of a component to be reused, recycled and remanufactured.

**Architectural Design Proposals Selection Based on Fuzzy Analytic Hierarchy Process**
Hao Qin[1], Fan Chen[1], Pingying Lin[1], Shutian Li[1]
[1]*Zhejiang University, China*

Architectural design (AD) proposals selection is one of the most crucial procedures before the final construction of a project. To make decisions, the jury members need to assess the design proposals considering various criteria, such as function, appearance, sustainability, context, economics, and so on. A model based on fuzzy analytic hierarchy process (FAHP) is proposed to select the most appropriate proposal with respect to various criteria, and at the same time, taking subjective judgments of decision makers into consideration. Finally, the model was applied to a real AD proposals selection work in Hangzhou, China. The results indicate that FAHP is capable of solving the problem of Architectural design selection.

**A General Fuzzy TOPSIS Based on New Fuzzy Positive and Negative Ideal Solution**
Nikbakhsh Javadian[1], Mohammad Kazemi[1], Fahime Khaksar-Haghani[1], Mehdi Amiri-Aref[1], Reza Kia[2]
[1]*Mazandaran University of Science and Technology, Iran*
[2]*Islamic Azad University, Iran*

This paper presents a fuzzy multiple criteria group decision-making (FMCGDM) problem with the Technique for Order Performance by Similarity to Ideal Solution (TOPSIS) based on the new concept of positive and negative ideal solution. Triangular fuzzy numbers (TFN) among decision-making process are used to evaluate the weighted different alternatives versus various. Additionally, in this paper we compared this algorithm with three algorithms, obtained interesting result and showed this result in two tables. This result indicates that our method is better than other algorithms.

**On Non-Existence of Nash Equilibrium of M Person Game with Pure Strategy for Delivery Services**
Kazuki Takahashi[1], Ushio Sumita[2]
[1]*Tokyo Gas Co., Ltd., Japan*
[2]*University of Tsukuba, Japan*

A competitive market model is considered with M suppliers and N customers, where each supplier provides a homogeneous service such as delivering propane gas cylinders and has to offer a uniform price upon delivery to all customers. Given a price upper bound U, the model is formulated as an M person game with pure strategy. It is shown that the M person game has the unique Nash equilibrium if and only if each customer can be serviced by at most one supplier. Furthermore, this unique Nash equilibrium is peculiar in that all suppliers adopt the same upper bound price U. In general, the M person game does not have any Nash equilibrium. For such a case, it is demonstrated that the suppliers continue to exercise their price strategies in a cyclic manner indefinitely.

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| **Session** | Decision Analysis and Methods 6 |
| **Date** | 12/11/2009 |
| **Time** | 11:00 - 12:30 |
| **Room** | Montparnasse V |
| **Chairs** | Malick Ndiaye, Soroosh Nalchigar |

**A New Decision Making Approach for Optimization of Multiple Response Problem**
Mahdi Bashiri[1], Majid Ramezani[1]
[1]*Shahed University, Iran*

This paper present a new method for multiple response optimization (MRO). Multiresponse problems comprise three stages: data gathering, model building and optimization. The most work in MRO don't consider the results of modeling stage while these outcomes can help in achieving the solution. In this paper, we incorporate the obtained results from stage of model building, i. e. the least significance difference (LSD) criterion, for procuring the non-dominated solution of problem. In proposed method, a number of non-dominated solutions is acquired by the modified goal programming approach and LSD concept. Then, using TOPSIS approach the resulted solutions are ranked and the preferred solution is gained. Finally, the proposed method is illustrated with a numerical example.

**Customer Behaviour Modelling in the Maximum Capture Model**
Malick Ndiaye[1]
[1]*King Fahd University of Petroleum and Minerals, Saudi Arabia*

Competitive Location Analysis addresses the issue of optimally locating firms that compete for market shares. It is therefore important to consider the impact of costumers' behavior and the way they chose to patronize any given firm. Using facilities selections based on the Maximum Capture Model, we introduce three different scenarios to illustrate how assumptions on customers' choices may alter traditional solution approaches. We assume here that an open facility will attract not all costumers closer to him but a portion of it relatively to the Service Level (SL) available for its customers; the rest of them will choose to patronize a different facility according to shopping attitudes. A comparison between the different approaches is then proposed.

**Concurrent-based Analysis Model of Product Development Flow Combining Forward with Backward Chain**
Huan-Min Xu[1], Ming-Hai Yuan[1], Ai-Min Ji[1], Da-Peng Wei[1]
[1]*HoHai university, China*

The pressure to shorten product development process has increased due to rapidly changing technology and customers' perceived needs. Many researchers address reducing product development time. These methods are, however, still time-consuming not well-structured. The push-pull model of product development flow (PPM-Flow) in this paper is concurrent-based analysis model by combining forward with backward chain. PPM-Flow is presented according to three kinds of relationship models. The reconstructing steps of product development process are described along with the methodology of reconstructing PPM-Flow. The method has been applied in the leading mechatronics company in China, which develops and manufactures automatic doors in trains or metro cars. The application result shows that product development cycle can be shortened using PPM-Flow.

**Cost-Benefit Analysis and Public Project Decision**
Xizhen Gao[1], Yu Li[2]
[1]*TianJin University, China*
[2]*TianJin University of Technology, China*

Cost-benefit analysis (CBA) is a common method used in investment decision. However, Cost-Benefit analysis exist some problems in public project decision practice. In this paper, the author studied the abroad development of cost-benefit method in the public project decision-making area. This paper introduced the problem of CBA implement in our country public projects decision-making and conventional solutions. According to the theoretical development abroad, we argue that system building and methods improving are both important, in order to improve public project decision-making efficiency.

**Competitiveness Factor Analysis of Public Traffic in Hebei Province**
Hui Sun[1], Zhengxu Ren[1], Zhiqing Fan[1], Ye Shi[1]
[1]*Tianjin University, China*

In this article, on the basis of Porter's competitive forces model, a competitiveness model of public transportation is proposed. Then several visualized indexes are selected and structural equation model is applied to calculate. At last, the quantitative result with high degree of fitting is calculated through AMOS software, which can be used in the policy making and implement of public transportation.

**Design of a Decision Support System for Selecting ultimodal Transportation route: An Integrated Model Using AHP and ZOGP Case study Thailand–Vietnam**
Warapoj Meethom[1], Athkorn kengpol[1]
[1]*King Mongkut's University of Technology North Bangkok, Thailand*

In an effort to reduce different culture-cognitive, regulation, and social needs of intraregional logistics and supply chain, the Government of GMS countries have initiated to adopt a holistic multimodal transportation routing. The objective of research, therefore, is to develop a DSS that can accommodate evaluation models and criteria including various factors to optimize multimodal transportation routing with maximum satisfaction in transporting goods within GMS countries. The DSS model is the combination of a number of models beginning with the AHP model to achieve priorities in quantitative and qualitative point of view from customers and multimodal transporters of the alternatives, following by the ZOGP which can integrate priorities from AHP with quantitative data to achieve an optimal multimodal transportation routing base upon limitation of time and budget. The collaborating firms are multimodal transportation companies which have destination from/to Bangkok and Vietnam. The results analysis, recommendations and limitation are also presented.

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| **Session** | Poster Session 3 |
| **Date** | 12/11/2009 |
| **Time** | 10:30 - 11:00 |
| **Room** | Longchamps I & II |

**Kinematic Analysis and Post-Processing Algorithm Research for 5-Axis CNC Machine Tools with a Universal Head**

Chun Xie[1], Weimin Zhang[1], Xinyuan He[2]
[1]*Tongji University, China*
[2]*Shenyang Machine Tool (Group) CO., LTD, China*

Improving the accuracy of 5-axis CNC machine tools is a problem for professional people to solve all the time. Its kinematic configuration and numerical control algorithm are crucial factors affecting errors. All the possible structural configurations of 5-axis CNC machine tools with a universal head were shown in this study. The optimal kinematic chain was presented from the view of kinematic errors and workpiece degrees of freedom (DOF). The general calculating formulation of tool center point (TCP) deduced by analyzed the special movement of 5-axis CNC machine tools with a universal head. It is pointed out that the tool axis orientation (TAO) only depends on rotational movements instead of translational ones. The post-processing algorithm of CAM programs was solved out through compound transmission matrix. It was concluded that TCP coordinate value, tool axis orientation and post-processing algorithm can not be changed with the sequence change of movement axes for 5-axis CNC machine tools with a universal head.

**The Simulation of Cutting Force of Free-form Surface Machining with Ball-end Milling Cutter**

Lei Shi[1], En Fu Liu[2], Yi Zhang[1], Peng Chen[1], Zongbin Li[1]
[1]*Xi'an Jiaotong University, China*
[2]*Hebei University of Science and Technology, China*

Based on the previous researches and according to the milling characteristics of ball-end milling cutter, the cutting force model is established. Using empirical formula, the feed rate of NC codes of machining free-form surface is optimized under constraint of nearly constant cutting force, and so as to decrease the fluctuation of cutting force. Thus, the machining quality and efficiency of part are improved and the service life of cutting tool is prolonged. This paper develops a prototype system under constraint of nearly constant cutting force. And an example is given to verify the effectiveness of the method. This paper lays a good foundation for the development of software module of cutting parameter optimization related to free-form surface machining.

**Cold Nosing Process Modeling and Simulation for Manufacturing of Aluminium Conical Milk Can**

Jinn-Jong Sheu[1], Hsien-Hsiu Su[1]
[1]*National Kaohsiung University of Applied Sciences, Taiwan*

The modeling and simulation methods for the manufacturing systems of conical milk cans are proposed. The processes adopted in this manufacturing system are divided into three stages: backward cup extrusion, ironing of the can body, and neck nosing of the can. The most crucial stage of this manufacturing system is the nosing process which usually takes many steps, vary from three to ten, to form the final shape and dimension precisely. The modeling of the maximum nosing rate is proposed to determine the steps required to make the can in the nosing stage. The conic curve model is proposed to design the nosing dies to minimize the nosing steps and obtain smoother material flow of forming process. Three-dimensional FEM simulations were carried out to evaluate the proposed die profile designs and validate the manufacturing system. The geometrical parameters of the proposed conic curves of die profile are optimized via the DOE method. The FEM simulation results show that the proposed die profile design method is capable of preventing the buckling defects and reducing the steps of nosing to three.

**A Manufacturing Performance Evaluation Model for Notebook Computer Manufacturers**

Rong-Hwa Huang[1], Chang-Lin Yang[1], Hui-lung Shih[1]
[1]*Fu Jen Catholic University, Taiwan*

The notebook computer industry is closely connected to global economies. The major notebook computer companies have cut their prices to increase market share in a highly competitive marketplace. The OEM manufacturers have sharply reduce profit to generate orders. The key to survival for ODM/OEM manufacturers is to improve production performance; however, production improvements require a complete production performance evaluation model and accurate evaluation indices. Such a model will help businesses exploit resources, improve production performance to meet customer needs and reach operational goals. This study divides the performance evaluation model for production of notebook computers into three stages: construction of preliminary evaluation indices; revision of evaluation indices; and, construction of an evaluation model. Evaluation indices are based on quality, cost, delivery and flexibility. These characteristics are used to develop 12 strategic themes and 69 performance evaluation indices. Preliminary evaluation indices are constructed using the Delphi method. Opinions from industrial, governmental and academic professionals are collected and analyzed. The Analytical Network Process (ANP) developed by Saaty is applied to weight indices for each characteristic. Finally, the complete model is deployed to evaluate the performance of the case company and verify model practicability.

**Noise Identification and Fault Diagnosis for the New Products of the Automobile Gearbox**

Wenli shang[1], Yigong yan[2], Haibo shi[1]
[1]*Shenyang Institute of Automation,Chinese Academy of Science, China*
[2]*Changchun University of Technology, China*

A noise identification and fault diagnosis for the new products of the automobile gearbox system is introduced. The framework of the developed software is described, which includes function modules as data acquisition, feature extracting, time frequency transform, order analysis, learning and training, and so on. The prototype system has been partially put in practice in a certain automobile gear-box manufacture company.

**Analysis of the Forming Defects of the Trapezoidal Inner-gear Spinning**

Qin-xiang Xia[1], Ling-yan Sun[1], Xiu-quan Cheng[2], Bang-yan Ye[1]
[1]*South China University of Technology, China*
[2]*Guangzhou Civil Aviation College, China*

Spin-forming of cup-shaped thin-walled trapezoidal inner-gear is a new technology of the near-net forming in gear manufacturing field. Experiments and FEM simulations shows that the quality of workpiece is greatly influenced by the forming process method. The defects, such as the un-uniform distribution of tooth height along the axial and tangential directions and the wave-shaped opening-end of workpiece etc., occur easily. The mechanism for defects during spinning is analyzed, which is mainly caused by the partial thickening (in the area of gear-tooth) and thinning (in the area of tooth-groove). Improved forming methods, such as stagger spin-forming, positive-reverse rotation of main spindle and adopting a restraint ring at the opening-end of blank, are put forward. The forming methods are simulated by MSC. Marc and are also investigated by experiments. The results show that the improved process methods overcome the forming defects effectively.

**Research on Tool Path Planning for Five-Axis Machining**

Peinan Li[1], Ruifeng Guo[1], Pin Wang[1], Yan Huang[1]
[1]*Shenyang Institute of Computing Technology, Chinese Academy of Sciences, China*

Tool path planning of CNC motion controller includes tool path interpolation and velocity planning. Five-axis machine tools have been adopted in mold surface and aerospace part machining. Due to the kinematics complexity of the machine tool, it is difficult to verify the correctness of the machining process. These errors may cause problems and damages in both workpiece and tool. To avoid these errors, in this paper, the kinematics frame based on dual quaternion D-H representation was applied to define the coordinates of five-axis machines systematically. Consequently, the kinematics parameter equation of the five-axis machine was obtained through this procedure. Jerk Control, which automatically applies the appropriate amount of acceleration control that creats smooth path transitions and consequently less mechanical stress on the machine. Thus, in this paper, an novel interpolation algorithm with quadric jerk velocity profiles was proposed. The experimental results show that the feasibility of proposed tool path planning for five-axis machining.

**Stock Index Prediction: A Comparison of MARS, BPN and SVR in an Emerging Market**

Chi-Jie Lu[1], Chih-Hsiang Chang[2], Chien-Yu Chen[1], Chih-Chou Chiu[2], Tian-Shyug Lee[3]
[1]*Ching Yun University, Taiwan*
[2]*National Taipei University of Technology, Taiwan*
[3]*Fu Jen Catholic University, Taiwan*

Stock index prediction seems to be a challenging task of the financial time series prediction process especially in emerging markets with their complex and inefficient structures. Multivariate adaptive regression splines (MARS) is a nonlinear and non-parametric regression methodology and has been successfully used in classification tasks. However, there are few applications using MARS in stock index prediction. In this study, we compare the forecasting performance of MARS, backpropagation neural network (BPN), support vector regression (SVR), and multiple linear regression (MLR) models in Shanghai B-Share stock index. Experimental results show that MARS outperforms BPN, SVR and MLR in terms of prediction error and prediction accuracy.

**A New GA-based RBF Neural Network with Optimal Selection Clustering Algorithm for SINS Fault Diagnosis**

Zhide Liu[1], Jiabin Chen[1], Yongqiang Han[1], Chunlei Song[1]
[1]*Beijing Institute of Technology, China*

In this paper, a new adaptive genetic algorithm (GA)-based radial basis function (RBF) neural network with optimal selection clustering algorithm (OSCA) is proposed for the fault diagnosis of micro electro-mechanical system (MEMS) gyroscopes and accelerometers of strapdown inertial navigation system (SINS). The number of hidden layer nodes and parameters of RBF neural network are obtained by using OSCA. The connection weights are encoded to generate the chromosome, which is operated by adaptive GA. Orthogonal least square algorithm (OLS) is used to train the weights and gradient descent algorithm (GDA) with momentum term is used to estimate the parameters of Gaussian function. Adaptive GA, OLS and GDA with momentum term iterate alternately. Experimental results show that the proposed GA-based RBF neural network with OSCA quickly converges and effectively improves the diagnostic accuracy rate of SINS fault diagnosis.

**A Smart Model for Urban Ticketing Based on RFID Applications**

Maria Grazia Gnoni[1], Alessandra Rollo[1], Piergiuseppe Tundo[1]
[1]*Dept. of Engineering for Innovation/University of salento, Italy*

Mobility of persons and goods currently represents an interesting field of application for innovative ICT tools as Radio Frequency Technology (RFID). RFID technology is increasingly spreading in logistics activities, such as warehouse management, supply chain traceability. In urban mobility, RFID could support an automatic vehicle and person identification system by reduced investment costs. In the present paper, authors propose an Integrated Mobility System (IMS) aiming to improve performances of ticketing management in a public transport network based on an intensive application of RFID technology.

**Applying Fuzzy Ruled Based to Flexible Routing Problem in a Flexible Manufacturing System**

Iraj Mahdavi[1], Amirhosein Fekri Moghaddam Azar[1], Morteza Bagherpour[2]
[1]*Mazandaran University of Science and Technology, Iran*
[2]*Islamic Azad University of Shiraz, Iran*

Due to the fact that production planning in flexible manufacturing systems (FMS) -especially in dynamic environment- is complicated, in today's competitive market, increasing accuracy of planning in such systems is highly desirable. In this paper, a fuzzy rule based approach is presented to investigate flexible routing in FMS as it is previously less focused in the literature. The objective is to find appropriate route due to jobs which should be operated on available machines in production line. The approach is to consider IF- Then rules based on real cases which may be actually occurred on the shop. After running fuzzy rule base system, appropriate route is therefore investigated. The approach is highly reliable for manufacturer who wishes to investigate proper flexible routing due to real situations in FMS environment. A numerical illustration also is given to demonstrate applicability of the proposed approach.

**A Multi-Agent and Extremal Optimization System for "Steelmaking-Continuous Casting-Hot Strip Mill" Integrated Scheduling**

Rigeng Ji[1], Yong-Zai Lu[1]
[1]*Zhejiang University, China*

This paper presents recent results in applying a multi-agent system combined with extremal optimization to deal with integrated scheduling for "steelmaking, continuous cast and hot strip mill", a multi-stage, hybrid and real-world production system in steel industry. The main goal of this research aims to minimize the energy losses through the optimization, cooperation, coordination and communications between the multiple knowledge-based agents. The problem formulation, system architecture and optimization algorithms are described. The simulation results with production size data show the applicability of the proposed solutions.

**Forecasting Stock Price Using Nonlinear Independent Component Analysis and Support Vector Regression**

Chi-Jie Lu[1], Jui-Yu Wu[2], Cheng-Ruei Fan[3], Chih-Chou Chiu[3]
[1]*Ching Yun University, Taiwan*
[2]*Lunghwa University of Science and Technology, Taiwan*
[3]*National Taipei University of Technology, Taiwan*

In developing a stock price forecasting model, the first step is usually feature extraction. Nonlinear independent component analysis (NLICA) is a novel feature extraction technique to find independent sources given only observed data that are mixtures of the unknown sources, without prior knowledge of the mixing mechanisms. It assumes that the observed mixtures are the nonlinear combination of latent source signals. This study propose a stock price forecasting model which first uses NLICA as preprocessing to extract features from forecasting variables. The features, called independent components (ICs), are served as the inputs of support vector regression (SVR) to build the prediction model. Experimental results on Nikkei 225 closing cash index show that the proposed method can produce the best prediction performance compared to the SVR models that use linear ICA, principal component analysis (PCA) and kernel PCA as feature extraction, and the single SVR model without feature extraction.

**Estimating the Inquiring Time Interval for the Patent Analysis by the Technology Obsolescence Cycle**

Hsiao-Chung Wu[1], Hung-Yi Chen[1]
[1]*Chaoyang University of Technology, Taiwan*

One of key issues in patent analysis is identifying time interval for querying patent records from databases. Inquiring patents with inappropriate time interval will lead to biased results that either emphasizes old patents or cannot reveal the structure of a technology area. The study proposed a systematic method for deciding the inquiring time interval, based on the patent's obsolescence cycle. Two USPC classes are analyzed for demonstrating. For including at least of 90% of survival patents, the study suggests the time interval of 9.2 years for the pure USPC 257 class. Use the time interval of 7.0 years for patents in the pure USPC 438 class. Use the time interval of 7.5 years for patents classified both in the USPC 257 and 438 classes.

**Demonstration Study on Small and Medium High-tech Enterprises Growth: The Case of Dalian**

Lin Li[1], Pengfei Zhou[2], Yan Wang[1]
[1]*Dalian Jiaotong University, China*
[2]*Dalian University of Technology, China*

According to the foreign research, small and medium-sized high-tech enterprises growth influence factors are get. Based on the large questionnaire investigation and using comparison analysis method, main factors that influence the growth of Dalian small and medium-sized high-tech enterprises is discussed. Through research, high-speed growth small and medium-sized high-tech enterprises and low-speed growth small and medium-sized high-tech enterprises are get. And the general characteristic of fast growth of small and medium-sized high-tech enterprises is compared with low-speed growth small and medium-sized high-tech enterprises. In the end, some analysis on small and medium-sized high-tech enterprises growth is get, which is contributing to Dalian small and medium-sized high-tech enterprises growth.

**The Antecedents and Consequences of Customer Knowledge Development in New Product Development**
Yen-Tsung Huang[1], I-Chun Chen[1]
[1]*Tunghai University, Taiwan*

This study explored customer knowledge development in the new product development (NPD) process and the antecedents and consequences of the customer knowledge development. Customer knowledge development means that NPD teams created, integrated, and applied the knowledge about customers' need and preference in the NPD process. This study proposed customer knowledge development is composed of customer interaction process and team learning process. Collecting 77 valid samples from Printed Circuit Boards and Power Supply of Taiwanese firms through survey and analyzing with PLS (partial least squares) model, most hypotheses are supported. The insightful implication in theory and practice are also discussed in this paper.

**Computer-aided Classification of Patents Oriented to TRIZ**
Yanhong Liang[1], Runhua Tan[1], Chaoyang Wang[2], Zhi-Guang Li[1]
[1]*Hebei University of Technology, China*
[2]*Hebei Polytechnic University, China*

TRIZ has been widely acknowledged as an effective tool to solve technical problems. In TRIZ theory, a significant operation of product innovation is to solve design contradictions. When an engineer formulates his problem as a contradiction, the Contradiction Matrix helps him to identify a representative Contradiction and Inventive Principles. But Inventive Principles are abstract, it will be more helpful to generate innovative problem-solving ideas for innovators if they obtain related examples from published patents which have solved the analogous contradictions and used the same Inventive Principles in different fields of science and engineering. Most of the current available automatic patent classification systems are based on technology field such as IPC and they are not applicable to TRIZ. Recent advance of computational linguistics allowed us to integrate text mining and TRIZ for patent classification. In this paper, a computer-aided approach to classify patents according to Inventive Principles is proposed.

**Constructing Model of Organizational Internal Knowledge Integration Based on Cultural Algorithm**
Sihua chen[1], Changqi tao[1], Wei he[1]
[1]*JiangXi University of Finance And Economics, China*

There is no doubt that knowledge integration has influence on the improvement of organizational performance. The recent fruitful research has proved it theoretically and empirically. However, the research how to integrate knowledge to better improve organizational performance is less. This paper proposes an internal knowledge integration model based on cultural algorithm. It integrates knowledge from micro and macro level to make the knowledge of the best individual become the common acknowledgement of organization. On the basis of it, this paper put forward two hypothesizes to analyze the mechanism of this model to improve organizational performance.

**The Empirical Study on the Creation of Corporate Intellectual Capital from the Perspective of Social Capital**
Jun-yi Ren[1]
[1]*Yantai University, China*

In 1998, Nahapiet and Ghoshal combined social capital and intellectual capital to study the influence mechanisms of corporate social capital towards intellectual capital creation, and put forward corresponding theoretical model. However, this theoretical model has not been verified so far. In this study, specific data of Chinese enterprises, SPSS, and Structural Equation are used to verify this model. The study results verify most of this model except the positive relationship between the trust and the will of resource exchanges, which may result from the different cultural and social elements in China.

**International Comparison on the Coordination Degree Between Economic Development and BERD Investment**
Haifeng Wang[1], Yafei Luo[1]
[1]*Beijing University of Technology, China*

The relationship between current BERD investment and economic development is analyzed in this paper by using the model of coordination degree of composite system. The author measures the degree of coordination between the economic development and BERD investment in China from 1992 to 2006. Comparison between China and major developed countries are also made. The result shows that the average coordination degree of the composite system in China is lower than major developed countries. There is a good developing trend in China. At last, it puts forward the proposal about the BERD investment with the development of economic.

**A New Classification Method on the Basis of a Patent-Science Relationship**
Yan-Ru Li[1], Tzu-Ying Li[1]
[1]*University of Aletheia, Taiwan*

International patent code (IPC) and United States patent code (UPC) are the two most common classification systems in the patent database, but they have difficulties in revealing the technological characteristics of different industries. This paper proposes a new method based on a science-technology relationship, offering three main contributions: first, provide a new classification method based on the patent scientific literature; second, assist high-technology firms to measure their competitors and have foresight on future science and technology roadmap; third, analyze the technological dynamics by tracking the patent and scientific keywords.

**Research on Parameter Transferring Complexity of Assembly Variant Design**
Xinsheng Xu[1], Xin Cheng[1], Zhengxiang Li[2]
[1]*China Jiliang University, China*
[2]*Zhejiang University, China*

Variant design is an effective mean to derive individual product rapidly. This paper focuses on the parameter transferring issue of assembly variant design, that is, to identify a parameter transferring path with minimum uncertainty. Parameter constraint network and uncertainty characteristic were presented. A measure of undefined parameter information was employed to describe the complexity of identifying a parameter value during variant design. Based on this, a modified path complexity of parameter transferring was formulated. By calculating path complexity of each potential transferring process, the parameter transferring path with minimum path complexity can be found. This analysis is convenient to make full use of customized information to design individual product so as to increase the rationality and efficiency of parameter valued. We illustrate our approach with examples.

**Customer-Oriented Library Services for Chinese Higher Education**
Jiahui Jiang[1], Yongbing Zhang[2]
[1]*Library of Southwestern University of Finance and Economics, China*
[2]*University of Tsukuba, Japan*

Even though most universities in China have successively introduced digital resources, traditional paper-based resources still share major percentage in the whole library resources. In the current library management schemes, the information of the resource requirement and usage record is not utilized effectively either in resource purchase decision or in resource allocation plan. Furthermore, there is no efficient approach proposed to utilize the advanced information technologies in library management. In this paper, we firstly analyze the patterns of the current library services in Chinese universities and points out some problems existing in the current resource management systems. We then propose several approaches attempting to improve user satisfactory and resource utilization by considering customer behavior and requirement information.

**An Ubiquitous Infrastructure Applications to Support Museum's Service**

Chen-Wo Kuo[1], Johannes K. Chiang[1]
[1]*National Chengchi University, Taiwan*

Following the success of using information and media technologies at National Palace Museum. Nowadays, it will use the state-of-the-art ubiquitous technologies to build an Ubi-museum service. The idea is to utilize the ubiquitous technologies including smart object, sensing network, and wireless network, etc. to showcase the possibilities of their applications in the museum context. Theses projects were originally plan to span many functional departments of the NPM including the curatorial, preservation and conservation, marketing and licensing, and educational divisions. This essay will highlight those projects newly different function and diversification for visitors.

**The Valuation of Money-Back Guarantees in Retailing Markets: A Real Option Approach**

Lieh-Ming Luo[1], Hui-Tzu Lee[2], Yu-Ping Hsieh[3]
[1]*Fu Jen Catholic University, Taiwan*
[2]*National Chung Hsing University, Taiwan*
[3]*Chihlee Institute of Technology, Taiwan*

In this paper, we propose an optimal pricing model for the money-back guarantee (MBG) which is a widely used mechanism to reduce consumers' perceived risk in retailing markets. In comparison with previous researches, this study especially adopts the concept of stochastic underlying process from conventional real option techniques and explores optimal pricing strategies for MBGs from the consumers' perceived value-based viewpoint. This stochastic process can describe the uncertainties associated with product valuation by consumers. This research addresses how a retailer can make optimal pricing strategy for MBGs, and to investigate the effects of some important factors on the MBGs value. An alternative model is developed to determine the optimal pricing strategy for MBGs under various conditions. The results could provide retailers with several management implications and could be a reference to help retailers make decision optimally for the pricing issues about MBG.

**Research on the Service-oriented Manufacturing Model**

Na Gao[1], Songzheng Zhao[1], Xiaodi Zhang[1]
[1]*Northwestern Polytechnical University, China*

Service-oriented manufacturing is a new industry model which integrating manufacturing and service. In this paper, the definition of service-oriented manufacturing is introduced. It is pointed out that the development of service-oriented manufacturing will play a key role in upgrading manufacturing sectors and growth of service sectors. Finally, this paper build a service-oriented manufacturing model which based on customer-oriented and whole processes services.

**Reachability Analysis of Service Process Model Based on Polychromatic Sets**

Xinqin Gao[1], Yan Li[1], Mingshun Yang[1], Qilong Yuan[1]
[1]*Xi'an University of Technology, China*

How to analyze the complex service processes is a key issue of service process management in rapidly changing environment. In this paper, a new approach to reachability analysis of service process model is proposed. The polychromatic sets (PS) theory is introduced and the PS model of service process is established. Based on PS contour matrix, the physical reachability and the time reachability are analyzed. Model simplification rules and algorithm are proposed to examine structure conflicts, and model decomposition algorithm is presented to verify physical reachability. Time consumption and deadline of activities are analyzed statically and dynamically. A case study of order service process is used to illustrate the effectiveness of the proposed approach.

**Safety Feasibility Analysis on the Liquid Organic Heat Transfer Material Heater Used in the Production Process of Bleaching Powder Concentrate**

Hui Cui[1], Zhisheng Xu[1], Wenhua Song[2]
[1]*Central South University, China*
[2]*Tianjin University of Technology, China*

This paper mainly analyzed the safety feasibility of liquid organic heat transfer material heater used in the production process of bleaching powder concentrate. Firstly, inherent hazards of bleaching powder concentrate are fire and explosion and it must not be stored or transported with oils and so on, and after analyzing the whole process flow the harmful factor is dry bleaching powder concentrate dust in the workshop and drying process is the focus of safety management. Secondly, inherent hazards of liquid organic heat transfer material heater lie in fire causing by the leakage of strongly osmotic liquid organic heat transfer material. Finally, by contrasting respective characteristics, the potential hazard has been recognized and identified. Liquid organic heat transfer material heater is improper for the production process of bleaching powder concentrate, and corresponding compensated measures have also been proposed.

**Stochastic Analysis on Probability of Fire Scenarios in Risk Assessment to Occupant Evacuation**

Guanquan Chu[1], Jinhui Wang[2]
[1]*Waterborne Transportation Institute, Ministry of Transport, China*
[2]*Shanghai Maritime University, China*

This study presents a framework of stochastic analysis on probability of fire scenarios in risk assessment to occupant evacuation. Probable fire scenarios were constructed by event tree with consideration of fire protection systems and manual intervention. Uncertainty of probability values of fire protection systems and manual intervention were analyzed by coupling fire dynamics model and Monte Carlo simulation based on stochastic input data, such as lognormal fire growth rate. Then, probability of fire scenarios was analyzed as variables with time.

**The Characteristics of Temperature Near the Ceiling of Liquid Fires in Vertical Laminar Clean Room Environments**

Yan Huo[1], Ye Gao[1], Hong Mei Wu[1], Jian He Zhao[1]
[1]*Harbin Engineering University, China*

Numerical simulations of a clean room were conducted by software FDS5.3 using large-eddy simulation (LES). The CFD model was first verified by comparing computational results with results of reduced scale clean room fire tests. The temperature near the ceiling round the fire location with three sizes acetone liquid fire were then studied for a typical full-scale clean room. Results show that the temperature near the ceiling is varied mainly due to the heat release rate (HRR). When the fire area is 0.5 m × 0.5 m, the excess temperature, near the ceiling in a horizontal distance 4.5 m from the fire centre, is below 50 K during the whole process; when the fire area is 2.0 m × 0.5 m, the temperatures above the ambient (300K), near the ceiling in a horizontal distance respectively 0.5 m and 2.5 m from the fire centre, get 50 K almost at the same time. However, under air ventilation, the temperature next to ceiling decreases fast with distance from the fire, so the radius of the smoke spread along the ceiling becomes small.

**Large Eddy Simulation of Smoke Movement in a Teaching Building**

Jian He Zhao[1], Ye Gao[1], Hong Mei Wu[1], Yan Huo[1]
[1]*Harbin Engineering University, China*

Smoke movement during fire in a large teaching building without sprinkler was simulated by large eddy simulation (LES) model. Several fire scenarios were considered to show the smoke movement in vertical and horizontal direction. It is found that the lower storey the fire location is, the more dangerous the people inside are for a multi-storey building. Also we can find when the smoke spreads along the corridor and encounters an atrium, it will accumulate largely in the atrium. In addition, the reasonable application of fire shutter was discussed. Simulated results show that simultaneous releasing the fire shutters of the fire storey and above can efficiently control smoke to spread horizontally.

**Study on the Assessment Method of Agroecosystem Health Based on the Pressure-State-Response Model**

Bo Li[1], H. L. Xie[2], H. H. Guo[1], Ying Hou[1]
[1]*Beijing Normal University, China*
[2]*Jiangxi University of Finance & Economics, China*

Agriculture is a conflict region for economical development and environmental protection, and agroecosystem health assessment is its foundation of sustainable development. Based on the character of agroecosystem and PSR (Pressure-State-Response) model, this paper selected some indicators of agroecosystem health and constructed the model of matter-element evaluation, which is applied to seven towns in DXQ (Daxing District) and got the following results: WSZZ (Weishanzhuang Town), LXZ (Lixian Town) are 'healthy'; CZYZ (Changziying Town), ADZ (Anding Town) and YHZ (Yinghai Town) are 'critical state'; XHMZ (Xihongmen Town), JGZ (Jiugong Town) are 'unhealthy'. The results are basically consistent with facts of seven towns, so the index system and method of evaluation are feasible.

**Modeling and Analyzing Safety-critical Parallel-series System Safety**

Qing Sun[1], Lirong Cui[1], Rong Pan[2]
[1]*Beijing Institute of Technology, China*
[2]*Arizona State University, United States*

There are working, and two failures states including fail-safe and fail-dangerous in safety-critical systems. This paper studies two different safety-critical parallel-series models by considering their components lifetime distribution possessing general forms. The indices of reliability and safety including the probabilities that the system in these states and mean time for the system under two different failure ways, are derived respectively. Various corresponding indices comparisons between the two different parallel-series system models, and among the series, parallel and parallel-series systems, are conducted. Finally some illustrative numerical examples are employed to show the procedures. The derived indices formulas are without component lifetime distribution assumptions, which have significant meanings for reliability analysis and safety design of the system.

**Integrating Socio-technological Factors Analysis Into Nuclear Power Plant Event Report and Safety Evaluation: A Systematic Framework**

Ziqing Zhai[1]
[1]*Shanghai Jiao Tong University, China*

Nuclear power plants (NPP) are complex socio-technological systems where safety is the supreme concern for all activities. While studies of past accidents reveal that technical, human and organizational factors are major contributors to violation of safety, a generically accepted paradigm for safety assessment is still unknown. Meanwhile, reporting safety-relevant event occurred in NPP operations has already become a common practice in many countries, which offers a good opportunity to enhance understanding on the mechanism that affects safety, as well as to improve data quality for further studies. Combining with recent progress in Probabilistic Safety Assessment (PSA), this paper provides a systematic framework to integrate socio-technological factors analysis into event report, in order to extract useful data from real cases, to conduct first-hand safety analysis and to in turn benefit further PSA studies, for the ultimate goal of improving safety in NPP daily operations.

**Comparsion the Maintenance Between Two-Unit Parallel Standby Systems and 2-out-of-3 Standby Systems**

Min Wang[1]
[1]*Chaoyang University of Technology, Taiwan*

Both two-unit parallel systems and 2-out-of-3 systems are common used standby systems. Several research has studied the maintenance policy for two-unit parallel systems. In this study, a cost-effective maintenance schedule, including testing strategy and surveillance test interval, for a 2-out-of-3 standby system is presented. For systems with identical units, uniformly staggered testing is shown to be the best testing strategy. The maintenance performance of the systems is compared with that of two-unit parallel systems (also considered as 1-out-of-2 system). Moreover, the results are also can be extended to general (n-1)-out-of-n systems.

**Risk Analysis of the City Gas Pipeline Network Based on the Fault Tree**

Yi-lin Yin[1], Guang-li Lin[1]
[1]*Tianjin University, China*

In order to control and reduce city gas accidents, it's very important to identify and analyze the relative risk factors existed in the city gas pipeline network comprehensively. Through the fault tree analysis, "gas leakage" was taken as the top event and four main reasons that led to gas leakage were found. According to above four reasons, the comprehensive fault trees were drew, which reflected the whole reasons to the top event "gas leakage". Finally, taking the third-party interference fault tree as the target to have a further analysis, and then a risk check list about third-party interference of city gas pipeline network was obtained, according to which, the prevention to gas pipeline network could be more effective.

**The Empirically Comparative Analysis of Advanced Manufacturing Paradigm of Chinese, Japanese and South Korean Enterprises**

Jun-yi Ren[1]
[1]*Yantai University, China*

Just-in-time Production (JIT) and Agile Manufacturing(AM)are both production paradigms that are widely used all over the world. JIT and AM are utilized to compare and analyze the manufacturing industry in China, Japan and South Korea. The application conditions and the development of JIT and AM in manufacturing industry in China, Japan and South Korea are analyzed separately, and then comparison is made by providing some useful and important comparison items of JIT and AM. It proposes the primary stage of JIT / AM mixed production paradigm of manufacturing enterprises in China by comparing Chinese JIT/AM production paradigm with that of Japan and South Korea. According to empirically comparative analysis, suggestions are given in popularizing and deepening JIT/AM in manufacturing industry, especially for the development of Chinese manufacturing.

**Maintenance Behavior-Based Prediction System Using Data Mining**

Pedro Bastos[1], Rui Lopes[1], Luis Pires[1], Tiago Pedrosa[1]
[1]*Instituto Politécnico de Bragança, Portugal*

In the last years we have assisted to several and deep changes in industrial manufacturing. Induced by the need of increasing efficiency, bigger flexibility, better quality and lower costs, it became more complex. The complexity of this new scenario has caused big pressure under enterprises production systems and consequently in its maintenance systems. Equipment and facilities availability means time for production and this means more money. Moreover, manufacturing systems recognize high level costs due equipment breakdown, motivated by the time spent to repair, which corresponds to no production time and scrapyard, and also for money spent in repair actions. Usually, enterprises do not share data produced from their maintenance interventions. This investigation intends to create an organizational architecture that makes the integration of data produced in factories on their activities of reactive, predictive and preventive maintenance. The main idea is to develop a decentralized predictive maintenance system based on data mining concepts similar to those that support virtual enterprises functionality. Predicting the possibility of breakdowns with bigger accuracy will increase systems reliability.

**Concept Analysis for Service Oriented Manufacturing Based on Interpretive Structural Modeling**

Yi-song(Lydia) Zheng[1], Dong Li[1], Feng Zhao[1]
[1]*Nankai University, China*

This paper analyses concept of Service Oriented Manufacturing based on the influencing factors summarized from a literature survey. The mutual relationships between the influencing factors and the concept have also been established and analyzed. The analysis is carried out by using the Interpretive Structural Modeling method in a qualitative and hierarchical manner.

# Author Index

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**R**



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**Internet Stations**
9, 10 & 11 December, Wednesday, Thursday, Friday
Longchamps Room – Level 3

**Useful Telephone Numbers**
**Conference Secretariat – Meeting Matters International**
Cheng-Hoon KHOO (Ms), Conference Manager
Tel: (65) 9819 9462

Patrick CHA (Mr), Operations Manager
Tel: (65) 9125 9090

**Emergency Services**

| | |
|---|---|
| Emergency Service (Police, Ambulance, Fire) | : 999 |
| General Police Enquiries | : 2527 7177 |
| Department of Health | : 2961 8989 |
| Taxi Union Lost Report Service Centre | : 2385 8288 |

**Transport Services**
• Urban (Red Taxies)
Available throughout Hong Kong including the airport and Disneyland (except for roads on the south side of Lantau Island and Tung Chung Road on Lantau which is open only to authorised vehicles).

| | |
|---|---|
| Kowloon Taxi Owners Association | : 2760 0411 |
| Wai Fat Taxi Owners Association Ltd | : 2861 1008 |
| Happy Taxi Operator's Association Ltd | : 2728 8281 |
| Golden Link Taxi Owners Association Ltd | : 2571 2929 |

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| | |
|---|---|
| Lantau Taxi Association | : 2984 1328 |

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|---|---|
| MTR 24-hour Enquiry Hotline | : 2881 8888 |

• Tram

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|---|---|
| Hong Kong Tramways Limited | : 2548 7102 |

**About Hong Kong**

| | |
|---|---|
| Hong Kong Tourism Board Visitor Hotline | : 2508 1234 |
| Weather Information | : 187 8066, 18501 (English) |
| Overseas IDD and Cardphone Enquiries | : 10013 |
| Radio Television Hong Kong Service Hotline | : 2272 0000 |
| Consumer Council | : 2929 2222 |
| Hong Kong International Airport | : 2181 0000 |
| Directory Enquiries | : 1081 |
| GovHK | : 1835500 |

# Services (cont'd)

**What to do & Where to go in Hong Kong**
(Own Time Own Target or Book A Tour at the Hotel Tour Desk)

## • *Clock Tower*

*Erected in 1915, the distinctive 44-metre red brick and granite tower is a graceful reminder of those Colonial times. Today, the site of the historic railway station is occupied by the Hong Kong Cultural Centre.*

**Getting There:**

1. MTR Tsim Sha Tsui Station Exit E, walk towards Salisbury Road, turn right, take pedestrian next to YMCA to Hong Kong Cultural Centre. Then turn right and walk straight ahead towards the waterfront.

2. Take Star Ferry from Central or Wan Chai and follow the signs. The clock Tower is located next to the Tsim Sha Tsui Star Ferry Pier.

## • *Temple Street Night Market*

*Temple Street is an amazing shopping sight, featuring rows of brightly lit stalls hawking an astonishing variety of inexpensive items. Fortune-tellers cluster at the Yau Ma Tei end of the street, as do Chinese opera enthusiasts seeking kindred spirits for impromptu performances.*

**Getting There:**

1. MTR Jordan Station Exit A. Turn right into Jordan Road and walk three blocks to Temple Street.

2. MTR Yau Ma Tei Station Exit C, walk along Man Ming Lane to Temple Street.

**Open : 4:00PM to 12:00AM**

## • *The Peak*

*Looking down from The Peak you'll be amazed by the spectacular view of the surrounding city skyline, the world-famous Victoria Harbour and Kowloon, towering skyscrapers and peaceful green hillsides.*

**Getting There:**

1. Take the Peak Tram from the Lower Peak Tram Terminus on Garden Road (Bus 15C from the lay-by outside Central Pier 6 or walk from MTR Central Station Exit J2).

2. Bus 15 from Exchange Square Bus Terminus (MTR Hong Kong Station Exit D)

3. Green minibus 1 from MTR Hong Kong Station Public Transport Interchange.

**Open : 10:00AM to 11:00PM (Mon - Fri),**
**8:00AM to 11:00PM (Sat, Sun & Public Holiday)**

## • *Madame Tussauds*

*Madame Tussauds Hong Kong is offering visitors an unprecedented hands-on multimedia experience at its celebrity waxworks museum. The world-famous attraction now features more than 100 incredible wax likenesses of stars, world leaders and sports heroes displayed in five totally interactive themed settings that are spread over three floors within the completely refurbished Peak Tower complex.*

**Getting There:**

1. Bus 15C from the lay-by outside Central Pier 6 to the Lower Peak Tram Terminus on Garden Road and take Peak Tram to the Peak.

2. Bus 15 from Exchange Square bus terminus (MTR Hong Kong Station Exit D) to the Peak.

3. Green minibus 1 from MTR Hong Kong Station Public Transport Interchange.

**Open : 10:00AM to 10:00PM.**
**(Last admission at 9:45PM)**

## • *Hong Kong Disneyland*

*Hong Kong Disneyland invites visitors into the legendary fairytale kingdom that celebrates the spirit of fantasy, the world of tomorrow and a forever-young sense of adventure. Mickey Mouse will welcome you to the happiest place on Earth complete with attractions exclusively designed for Hong Kong.*

**Getting There:**

1. By MTR, Disneyland Resort Line. The conveniently located Disneyland Resort Station is your gateway into the magic.

2. By Bus, Both Local and Cross-boundary buses are available to take you to and from Hong Kong Disneyland.

3. By Taxi, Three types of taxis - Urban taxis, New Territories taxis, Lantau taxis - provide transportation services to and from Hong Kong Disneyland.

**Open : 10:30AM - 8:00PM (Peak Park Day)**

## • *Po Lin Monastery*

*No trip to Hong Kong would be complete without a visit to the world's tallest, outdoor, seated bronze Buddha which sits serenely atop Ngong Ping plateau amid the spectacular mountain scenery of Lantau Island.*

**Getting There:**

1. Catch ferry from Central Pier 6 (MTR Hong Kong Station Exit E1. Walk through ifc mall) to Mui Wo, then take bus 2

2. MTR Tung Chung Station Exit B, then take bus 23 from Tung Chung Town Centre

**Monastery Opens : 9:00AM to 6:00PM**
**Big Buddha Opens : 10:00AM to 6:00PM**
**Vegetarian Meals Serving Hours : 11:30AM to 5:00PM**
**Enquiries : (852)2985 5248**

**Source: http://www.discoverhongkong.com/eng/attraction/sightseeing-guide.html**

# Notes

# DANIEL J. EPSTEIN DEPARTMENT OF INDUSTRIAL & SYSTEMS ENGINEERING

**Masters of Science in**
**Health Systems Management Engineering**

The newest program available through the Epstein ISE department is our Master of Health Systems Management Engineering, a joint program with the School of Policy, Planning and Development's Master of Health Administration program that prepares students for process improvement roles in the health care industry, particularly hospitals and health management organizations.

## GRADUATE PROGRAMS

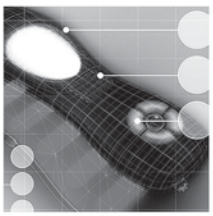
**MS in Engineering Management**

**MSISE/MBA Dual Degree**

**MS in Manufacturing Engineering**

**MS in Operations Research Engineering**

**Graduate Certificate in Optimization and Supply Chain Management**



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# UNIVERSITY OF SOUTHERN CALIFORNIA • VITERBI SCHOOL OF ENGINEERING

PROGRAMS IN SYSTEMS AND ENGINEERING MANAGEMENT DIVISION

# Nanyang Technological University, Singapore

NANYANG TECHNOLOGICAL UNIVERSITY

**The Division of Systems and Engineering Management (SEM)** is part of the School of Mechanical and Aerospace Engineering, which has 150 faculty members, and is one of the largest engineering Schools in the world: see, www.ntu.edu.sg/mae/.

Systems and Engineering Management includes topics such as Supply Chain and Logistics Management, Service systems including healthcare service, Human Factor Engineering, Project Management in Supply chain performance, Manufacturing systems and Design and Manufacturing of Mass Customized Products.

*In the SEM Division there are 19 faculty members in the following areas of expertise:*

1. Systems Engineering
2. Human Factors Engineering
3. Operations Research
4. Design Studies

Corresponding to these interests there are three NTU Centres in: Human Factors & Ergonomics, Supply Chain Management and Project Management and Advancement.

The Human Factors Group is the largest in Asia. The main interest is in improving Human Tasks & Activities and Interactions. This includes design of equipment and work procedures to enhance productivity and safety.

## Research Programs

There are many research programs in SEM. As an example we mention CATER, which is the largest research program in SEM. It is sponsored by the European Commission, and there are 14 partners – most of which are in Europe.

*The purposes are to:*

- Design automobiles that appeal to customers through their exterior design – How can one design a car that looks cute?
- Set up a virtual environment on the web, where a buyer can customize the design of the car and then buy it

## M.Sc. Programs

The Master of Science program provides graduate level education. It is conducted both part-time (for people who work) and full-time. Applications for admission to the program are invited twice a year through announcements in the press prior to the commencement of the program in either August or January of the following year.

*There are three M.Sc. Programs:*

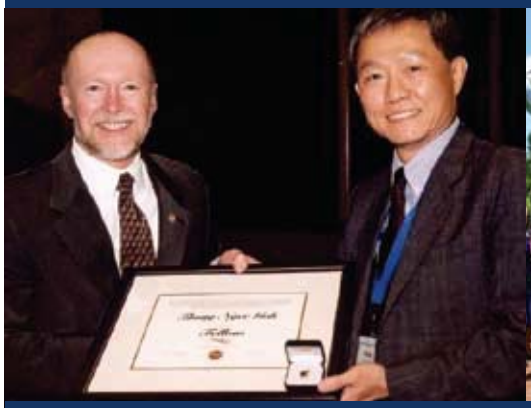
1. M.Sc. Human Factors Engineering
2. M.Sc. Logistics
3. M.Sc. Systems Engineering (New)

## Research Programs

Ph.D. and M.Eng. are research-oriented programs. Here the student will take several courses, but most of the work is on research. The student will work together with an advisor, who will help to define a research topic and guide the student.

Typically a student will take a M.Eng. degree and then continue to take a Ph.D. However, applicants with an outstanding bachelor's degree can be admitted directly into the Ph.D. program.

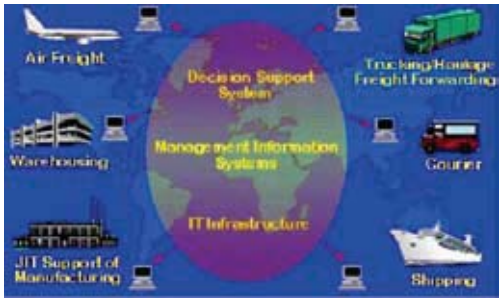
# INDUSTRIAL AND SYSTEMS ENGINEERING AT THE NATIONAL UNIVERSITY OF SINGAPORE



**BUILT** upon a collection of methodological tools brought together to effect an integrated or total approach to problem-solving in engineering, with productivity and quality improvement as its overall objectives.

**KNOWLEDGE** domain covers broad areas including engineering, mathematics, statistics, computing, social science, and management. The ISE discipline brings a holistic perspective to problem solving within a systems context.

**http://www.ise.nus.edu.sg**



## Focus of the Department:

- Manufacturing and engineering industries
- Logistics industry
- Defence industry
- Service industry

## Research trusts of the Department:

- Logistics and Supply Chain Management
- Quality Engineering
- Service and Innovation Management
- Systems Modeling and Optimization

## Programs of the Department:

- Bachelor of Engineering (Industrial and Systems Engineering)
- Bachelor of Technology (Industrial and Management Engineering)
- Master of Science (Industrial and Systems Engineering)
- Master of Engineering and Doctor of Philosophy

The Industrial and Systems Engineering Department at the National University of Singapore has come a long way since its formation in 1972. Today, we are a comprehensive department offering the BEng, BTech, MSc, MEng, and PhD degree programs. As the only ISE department in Singapore, we offer a rigorous and yet flexible curriculum full of exciting possibilities ranging from industry-inspired design projects to overseas attachments. In the coming years, ISE will actively recruit, develop and retain talent with the passion to bring out a new breed of engineers who possess the analytical skills to deal with problems holistically. Together, we reinforce NUS' leadership in quality education and research, and develop international visibility.

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