



IEEM2010
7 to 10 December 2010, Macao

IEEM2010

The Venetian® Macao—Resort—Hotel
7 to 10 December 2010
www.IEEM.org

The IEEE International Conference on Industrial Engineering and Engineering Management



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The IEEE International Conference on
Industrial Engineering and Engineering Management



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A World of difference, the difference is Macau

The University of Macau (UM) was founded in 1981 as a private institution by the name of University of East Asia. Through over two decades' development, it has become a leading university in Macao. UM offers around 100 bachelor's, master's and PhD programs with English being the main medium of instruction through various academic units and currently has over 6,900 students and over 400 teaching staff. The start of construction of the new campus signaled a new era in the development of Macao's higher education and presented UM with unprecedented development opportunities. Covering an area of around 1 km², the new campus will be nearly 20 times larger than the existing campus and will be able to accommodate approximately 10,000 students. The "residential college system" adopted by some of the world's top universities will be introduced in the new campus to complement the faculty system, which will constitute one of the highlights of the new campus.

Approximately eight faculties, including Faculty of Arts, Faculty of Social Sciences, Faculty of Science and Technology, Faculty of Business Administration, Faculty of Law, Faculty of Education, and Faculty of Life Science and Health, will be established, in order to offer more choices for local secondary school graduates and to nurture professionals in various fields to meet the needs of the moderate industrial diversification of Macao. For instance, the establishment of the logistics and service management program is in the preparation in order to develop the logistics industry in Macau and Pearl River Delta Area.



Faculty of Business Administration: Finance, Accounting, E-Business, Global Business, Management and Marketing, Commercial Gaming Management, Logistics and Service Management (to be developed)

Faculty of Education: Information and Communication Technology in Education, Educational Research on Well-Rounded Growth and Development, Educational Testing and Assessment

Faculty of Science and Technology: Computer and Information, Engineering Civil and Environmental, Engineering Electrical and Electronics, Electro-mechanical

Faculty of Social Sciences and Humanities: History, Psychology, Sociology, Portuguese, Chinese, English, Communication, Economics, Government and Public Administration

Faculty of Law: European Union Law, International Law and Comparative Law, International Business Law

Faculty of Life Science and Healthy (to be developed)



IEEE
IEEM2011

6 to 9 December 2011, Singapore

Furama RiverFront Hotel

www.IEEM.org

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

Deadline for Submission: 1 June 2011

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.

Master of Science in Engineering Management (MSEM)

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

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

Engineering Management Context

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

Engineering Doctorate (EngD)

The Engineering Doctorate is a professional doctorate degree. The Engineering Doctorate program at 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.

ENQUIRIES

Department of Manufacturing Engineering
and Engineering Management (MEEM)
City University of Hong Kong
Tel: 3442 8420
Fax: 3442 0172
Email: meem@cityu.edu.hk
www.cityu.edu.hk/meem/

The graduates will develop:

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

Functional Needs of Engineering Management

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

Empathy

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

Provide world-class education

Maximize students' potentials

Capture global opportunities



Since our establishment in 1993, the IELM Department has made notable strides. Our relentless pursuit of excellence in teaching and research has received international recognition. Joining the IELM Department at HKUST as a postgraduate student gives you the opportunity to take up leadership roles in different businesses from logistics management, quality assurance, product development and advanced manufacturing. We emphasize strategic issues, integration and customer-orientation to enable our graduates to have a comprehensive grasp of both technological and managerial aspects of contemporary issues.



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

2009 INFORMS INTERNATIONAL CONFERENCE ON SERVICE SCIENCE



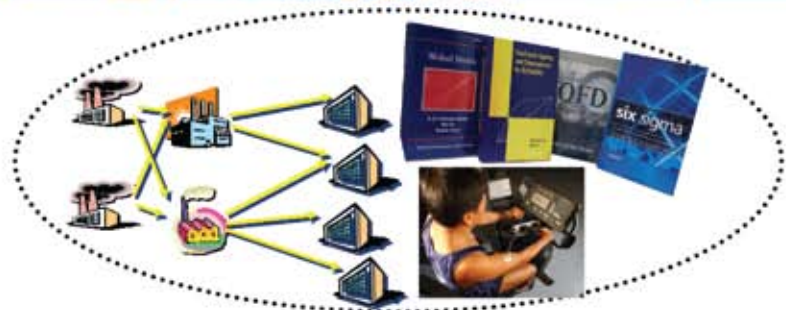
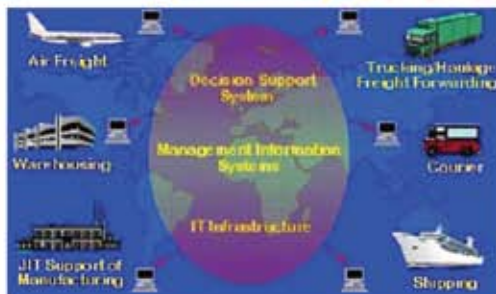
INDUSTRIAL AND SYSTEMS ENGINEERING AT THE NATIONAL UNIVERSITY OF SINGAPORE



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

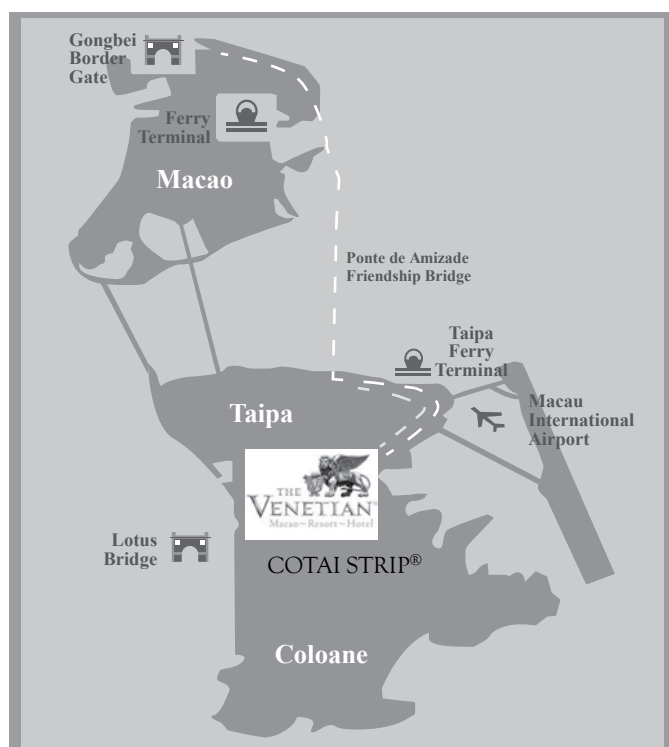
Programs of the Department:

- 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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Welcome Message

by Conference Chairs



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Singapore



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Georgia Institute of Technology,
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Program Chair,
Faculty of Business Administration,
University of Macau,
Macau



Zhang Wu,
Program Chair,
Department of Systems & Engineering Management,
Nanyang Technological University,
Singapore



Welcome Message

by Conference Chairs

It is our great pleasure to welcome you to the 2010 IEEE International Conference on Industrial Engineering and Engineering Management held here in Macau. This series of conference, started by the Singapore Chapter of IEEE Technology Management Council (formerly known as Engineering Management Society) has been successfully held in Singapore (2007 and 2008) and in Hong Kong (2009). It was decided to hold this conference in Macau because of the strong interest of this event in this region.

This year, the conference attracted close to 1200 submissions. As in the past, each paper was sent to 3-4 reviewers, comprising the technical program committee members and some author-reviewers. About 500 papers are included in the proceedings. The rigorous review process has helped to maintain a high standard of this conference.

We would like to thank all the authors for their contribution and all the technical program committee members and other reviewers for their help in the review process.

IEEM2010 is truly an international event with about 50 countries/regions represented. We have close to 100 parallel sessions at this conference covering all topics related to industrial engineering and management. In addition, we also have three prominent keynote speakers. Detailed information can be found in this program book.

We hope that all participants find time to discuss about the research beyond the usual attendance of the sessions, and make more friends internationally. And we wish you to have a pleasant stay in Macau.

Wei Zhao

General Chair, University of Macau

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Organizing Committee Chair, Georgia Institute of Technology

Zhaotong Lian

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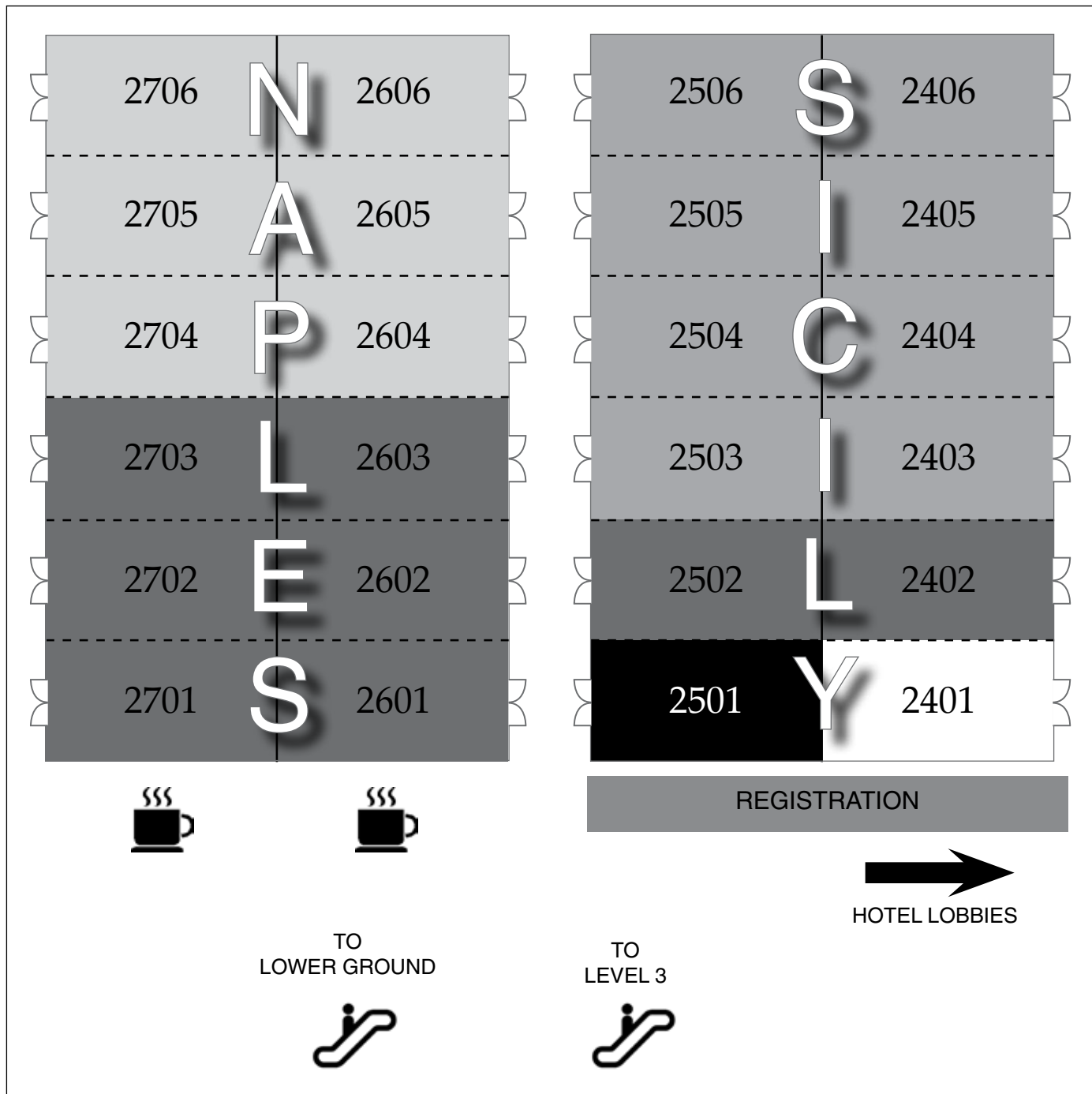
Nanyang Technological University

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City University of Hong Kong

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Meeting Rooms - Floor Plan



-  Opening & Keynote Presentations
-  Break-out Rooms
-  Lunch Buffet & Conference Banquet
-  Poster Sessions & Internet Stations

Program Overview

Time & Date		Meeting Rooms and Sessions								
Day 0 7 Dec 10 Tue	12:00	SICILY Foyer – Registration Desk Opens p. 12								
	13:00	Pre-Conference Tour – Half Day Macau City Tour p. 12								
	16:00-18:00	SICILY 2403 - 2505 – Welcome Reception p. 12								
		NAPLES 2703	NAPLES 2603	NAPLES 2702	NAPLES 2602	NAPLES 2701	NAPLES 2601	SICILY 2502	SICILY 2402	SICILY 2501
Day 1 8 Dec 10 Wed	9:00-10:30	NAPLES 2604 - 2706 – Opening, Keynote Presentations I & II p. 13 & 14								
	11:00-12:30	Decision Analysis & Methods (1) p. 18	Technology & Knowledge Management (1) p. 19	Supply Chain Management (1) p. 20	Production Planning & Control (1) p. 21	Operations Research (1) p. 22	Quality Control & Management (1) p. 23	Manufacturing Systems (1) p. 24	Project Management (1) p. 25	Poster Session 1 p. 26 & 27
	12:30-13:30	SICILY 2403 - 2506 - Lunch Buffet								
	13:30-15:00	Decision Analysis & Methods (2) p. 18	Technology & Knowledge Management (2) p. 19	Supply Chain Management (2) p. 20	Information Processing & Engineering (1) p. 21	Service Innovation & Management (1) p. 22	Human Factors (1) p. 23	Manufacturing Systems (2) p. 24	Engineering Education & Training p. 25	
	15:30-17:15	Decision Analysis & Methods (3) p. 18	Technology & Knowledge Management (3) p. 19	Supply Chain Management (3) p. 20	Information Processing & Engineering (2) p. 21	Service Innovation & Management (2) p. 22	Human Factors (2) p. 23	Reliability & Maintenance Engineering (1) p. 24	E-business & E-Commerce p. 25	
Day 2 9 Dec 10 Thu	9:00-10:30	NAPLES 2604 - 2706 – Keynote Presentation III & Meet-the-Editor Panel p. 15 & 17								
	11:00-12:30	Decision Analysis & Methods (4) p. 28	Technology & Knowledge Management (4) p. 29	Supply Chain Management (4) p. 30	Production Planning & Control (2) p. 31	Service Innovation & Management (3) p. 32	Human Factors (3) p. 33	Safety, Security & Risk Management (1) p. 34	Project Management (2) p. 35	Poster Session 2 p. 36 & 37
	12:30-13:30	SICILY 2403 - 2506 – Lunch Buffet								
	13:30-15:00	Decision Analysis & Methods (5) p. 28	Technology & Knowledge Management (5) p. 29	Supply Chain Management (5) p. 30	Production Planning & Control (3) p. 31	Operations Research (2) p. 32	Quality Control & Management (2) p. 33	Safety, Security & Risk Management (2) p. 34	Systems Modeling & Simulation (1) p. 35	
	15:30-17:15	Decision Analysis & Methods (6) p. 28	Technology & Knowledge Management (6) p. 29	Supply Chain Management (6) p. 30	Production Planning & Control (4) p. 31	Operations Research (3) p. 32	Quality Control & Management (3) p. 33	Safety, Security & Risk Management (3) p. 34	Systems Modeling & Simulation (2) p. 35	
		SICILY 2403 - 2506 – Conference Banquet p. 12								
Day 3 10 Dec 10 Fri	9:00-10:30	Decision Analysis & Methods (7) p. 38	Intelligent Systems (1) p. 38	Engineering Economy & Cost Analysis (1) p. 39	Production Planning & Control (5) p. 40	Service Innovation & Management (4) p. 40	Quality Control & Management (4) p. 41	Reliability & Maintenance Engineering (2) p. 42	Global Manufacturing & Management (1) p. 42	Poster Session 3 p. 44 & 45
	11:00-12:30	Technology & Knowledge Management (7) p. 38	Intelligent Systems (2) p. 39	Engineering Economy & Cost Analysis (2) p. 39	Systems Modeling & Simulation (3) p. 40	Operations Research (4) p. 41	Eco-system and New Business Model p. 41	Reliability & Maintenance Engineering (3) p. 42	Global Manufacturing & Management (2) p. 43	
	12:30-13:30	SICILY 2403 - 2506 – Farewell Lunch								
		From 13:30	Post-Conference Visit – University of Macau p. 12							



Conference Highlights

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

12.00 pm	Registration Desk Opens	Level 1 SICILY Foyer
12.45 pm	Pre-Conference Tour	Meet at SICILY Foyer
4.00 to 6.00 pm	Registration & Welcome Reception	Level 1 SICILY 2403 - 2505

Pre-Conference Tour

(Please present ticket before you board the coach)

Half Day Macau City Tour

Coach Departs Hotel 1.00 pm and
Returns 5.00 pm

8 Dec – Wed to 10 Dec – Fri

Poster Sessions, Daily Coffee/Tea & Lunch

10.30 to 11.00 – AM Break	3.00 to 3.30 – PM Break	Level 1 NAPLES Foyer
10.30 to 11.00 – AM Poster	3.00 to 3.30 – PM Poster	Level 1 SICILY 2501
12.30 to 1.30 pm	Lunch Buffet	Level 1 SICILY 2403 - 2506

8 Dec – Wed: Opening, Keynote Presentations & Concurrent Sessions

8.00 to 8.45 am	Registration Desk Opens	Level 1 SICILY Foyer
8.45 am	Guests & Delegates to be seated	Level 1 NAPLES 2604 - 2706
9.00 to 9.50 am	Opening & Keynote I p. 13	Level 1 NAPLES 2604 - 2706
9.50 to 10.30 am	Keynote II p. 14	Level 1 NAPLES 2604 - 2706

9 Dec – Thu: Keynote Presentations & Concurrent Sessions

8.00 to 8.45 am	Registration Desk Opens	Level 1 SICILY Foyer
8.45 am	Guests & Delegates to be seated	Level 1 NAPLES 2604 - 2706
9.00 to 9.45 am	Keynote III p. 15	Level 1 NAPLES 2604 - 2706
9.45 to 10.30 am	Meet-the-Editor Panel p. 17	Level 1 NAPLES 2604 - 2706

IEEM2010 Conference Banquet

(Please present dinner ticket upon entrance)

Function starts 6.00 pm

Level 1 SICILY 2403 - 2506

10 Dec – Fri: Concurrent Sessions

8.30 to 11.30 am	Registration Desk Opens	Level 1 SICILY Foyer
2.30 pm	Post-Conference Visit	Meet at SICILY Foyer

Post-Conference Visit

(Please present ticket before you board the coach)

Visit University of Macau

Coach Departs Hotel 1.30 pm

Wed – 8 Dec, 9.10 to 9.50am

SYSTEM IDENTIFICATION: THE PATH FROM DATA TO MODEL

Lennart Ljung

Div. of Automatic Control

Dep. of Electrical Engineering Linköpings Universitet

Sweden



Abstract

System identification is the art and science of building mathematical models of dynamic systems from observed input-output data. It can be seen as the interface between the real world of applications and the mathematical world of control theory and model abstractions. As such it is a ubiquitous necessity for successful applications.

The area has many facets and there are many approaches and methods. The presentation aims at both giving an overview of the “science” side, i.e. basic principles and result and at illustrating the practical, “art”, side of how to approach a real problem.

System identification is a very large topic, with different techniques that depend on the character of the models to be estimated, linear, non-linear, hybrid, nonparametric etc. At the same time, the area can be characterized by a small number of leading principles, e.g. to look for sustainable descriptions by proper trade-offs in the triangle of model complexity, information contents in the data, and effective validation.

The fundamental character of this tool of linking real observations to mathematical abstractions means the field is vital to many different application areas. This also has the consequence that different perspectives and nomenclatures for the tools have developed. System Identification is the perspective taken by the Automatic Control community. The underlying principles are of course the topic of Statistical Theory. A Computer Science view is to talk about Learning and Autonomy and in Signal Processing, Sensor and Information Fusion are related terms. Special model structures, such as Neural Networks, econometric models, or parameterized differential and differential algebraic equations have lead to separate research communities with perspectives of their own.

Attempts will be made in the talk to unify these different perspectives.

About the Keynote Speaker

Lennart Ljung received his PhD in Automatic Control from Lund Institute of Technology in 1974. Since 1976 he is Professor of the chair of Automatic Control in Linköping, Sweden, and is currently Director of the Strategic Research Center “Modeling, Visualization and Information Integration” (MOVIII). He has held visiting positions at Stanford and MIT and has written several books on System Identification and Estimation. He is an IEEE Fellow, an IFAC Fellow and an IFAC Advisor as well as a member of the Royal Swedish Academy of Sciences (KVA), a member of the Royal Swedish Academy of Engineering Sciences (IVA), an Honorary Member of the Hungarian Academy of Engineering and a Foreign Associate of the US National Academy of Engineering (NAE). He has received honorary doctorates from the Baltic State Technical University in St Petersburg, from Uppsala University, Sweden, from the Technical University of Troyes, France, from the Catholic University of Leuven, Belgium and from Helsinki University of Technology, Finland. In 2002 he received the Quazza Medal from IFAC, and in 2003 he received the Hendrik W. Bode Lecture Prize from the IEEE Control Systems Society, and he was the recipient of the IEEE Control Systems Award for 2007.

Keynote Presentation



Wed – 8 Dec, 9.50 to 10.30am

QUALITY MANAGEMENT: FROM DELUSION TO REALITY

Thong Ngee Goh

*Industrial and Systems Engineering Department
National University of Singapore
Singapore*

Abstract

Quality Management in recent years appears to be crowded with various means rather than ends. Witness the myriad certification programs on offer in the market, for either individuals or organizations, and pronouncements such as “Do Things Right the First Time”, “Work Smarter, not Harder”, etc. on company websites, management speeches, lobby posters and such like. The serious question every Industrial Engineer or Engineering Manager ought to ask is: Does Quality improves as a result of certifications, slogans, pep talks and will power? If yes, are these necessary and sufficient? If no, what more or what else is available or should be done? These are veritable issues of vital interest to all who are concerned with quality management, as an organization stands and falls, ultimately, on the quality of products or services coming from it.

About the Keynote Speaker

Prof T N Goh is the Founding President of the Institute of Industrial Engineers Singapore, and formerly Vice President and Honorary Secretary of the Operational Research Society of Singapore, and President of the Singapore Institute of Statistics. He obtained his BE from the University of Saskatchewan, Canada and PhD from the University of Wisconsin-Madison. He is also Academician, International Academy for Quality (IAQ), Fellow, American Society for Quality (ASQ), and Honorary Member, Singapore Quality Institute. He is the recipient of the 2005 IEEE Engineering Management Society “Educator of the Year” Award, the 2007 ASQ William G Hunter Award, the 2007 IAQ Masing Book Medal (for the book: Six Sigma: Advanced Tools for Black Belts and Master Black Belts, Wiley, 2006), and the 2010 Harrington-Ishikawa Medal. Prof Goh has authored or co-authored more than three hundred research papers and four advanced books on Quality.

Thu – 9 Dec, 9.00 to 9.45am

ENGINEERS AND SCIENTISTS: PROPELLERS OF TECHNOLOGICAL INNOVATION FOR COMPETITIVE ADVANTAGE

Michael K. Badawy,

*Professor of Management of Technology and Strategic Management
Editor-in-Chief, Journal of Engineering and Technology Management
Virginia Tech University
USA*



Abstract

Whether a country can move forward or fall behind in the world order is decided by many factors led by its ability to educate, produce, and utilize engineers and scientists. Science, technology, and innovation are the propellers of our infinitely evolving world. The past decade witnessed unprecedented global economic changes brought about by the power of a steady stream of emerging technologies. New technology becomes obsolete at a much faster rate; and disruptive innovation has become the currency of the day. Risk-averse organizations have little chance to make it big in the market place. Critical success factors necessary for an organization to thrive are primarily dependent on their ability to create and deliver technologies. Creating new technology is the driver of the strategic entry and positioning in global markets. In order to compete effectively, companies must leverage their existing infrastructure knowledge assets, stimulate innovation, and align their dynamic capabilities processes. There is a need for corporations to understand the complexity of the strategic integration of information technology capabilities, knowledge management programs, along with inventive corporate initiatives for enhancing value creation and improving their competitive advantage.

The presentation will explore these issues, outline linkages, and propose action strategies.

About the Keynote Speaker

Dr. Michael Badawy mbadawy@vt.edu is a corporate management expert, global professor of Management of Technology and Strategic Management at Virginia Tech, the United States. He received his doctorate with honors from New York University Stern Graduate School of Business. He is Editor-in-Chief, Journal of Engineering and Technology Management.

Professor Badawy is a leading authority on engineering management, management of technological innovation, technological entrepreneurship, new product development, R&D management, and the strategic management of technology. His record includes over 250-articles in scholarly and professional journals, 28-authored or edited books. Many of his seminal publications were translated to Japanese, Spanish, Korean, and Chinese. This includes his book *Developing Managerial Skills in Engineers and Scientists* Wiley, 2nd edition, which was selected by the IEEE for the Engineering Certification examination.

His Pioneering work and institutional building include: spearheading the founding of the first Technology and Innovation Management Assembly in the world, The Academy of Management; the Founding Editor-in-Chief of the first Journal on Engineering and Technology Management, JET-M- Elsevier, One of the original Five Nucleus Founders of the International Association for Management of Technology "IAMOT", and the Founding Editor-in-Chief of two book series on Management of Technology. He is frequently invited by universities and foreign governments to help direct the creation and development of educational programs, and to deliver lectures to faculty and students. He is the recipient of numerous international and national leadership, honors, and distinguished service awards for his pioneering institutional building and ground-breaking work.



Keynote Presentation

As a corporate management expert, Dr. Badawy is capable of combining cutting-edge research, proven methods, and transforming them into practical, actionable, and results-oriented mechanisms for optimizing client's competitive advantage. Michael leads corporate training, global education, and consults in the U.S. and abroad. His clients include corporations, government agencies, and universities in the United States, Canada, Europe, Japan, Korea, Singapore, Thailand, Malaysia, Australia, and China.

In his client-focused approach, Michael utilizes state of the art knowledge along with breadth and depth of skills. As hands on strategic results-oriented practitioner; he is sought by, and worked with Fortune 500 companies' executives, managers, and corporate leaders. For more than two and half decades, he helped them: a- identify and develop organizational and managerial competencies; b- understand and manage technology for enhancing corporate competitive advantage; c- manage and utilize technical professionals as a most valuable intellectual capital; d- transfer expert knowledge essential for corporate profitability in fast changing global markets in our borderless world.

His list of clients includes IBM, Hewlett-Packard, 3M, Proctor & Gamble, Bell Laboratories, General Electric, TRW, United Technology, B.F. Goodrich, Deluuew Cather, Dynamic Research Corporation, Solarex, South-West Research Institute, Diamond Shamrock Corporation, Gould, SCM, Ciba-Geigy, AT&T, Schlumberger, Dupont, Philips, Siemens, Lockheed Martin, Sakstel, Toshiba, and other medium and smaller- size corporations; National Science Foundation, U.S. Department of Commerce, NASA, Office of Management and Budget, Naval Surface Warfare Center, Indian Head Naval command, The United Nations, The World Bank, Organization for Economic Cooperation for Development(OECD), and the UNESCO.

Dr. Badawy's work has been featured in the New York Times, The Wall Street journal, The Chicago Tribune, Best of Business magazine, Forbes, Engineering Times, the Journal of Japan's Union of Scientists and Engineers (JUSE-Tokyo), The Bangkok Post, The Straits Times, The Madrid Daily Times Dispatch, The south China Morning Post, The Korea Times, Inside R&D, and the American Society for Training and Development (ASTD) publications.



Meet-the-Editor Panel

Thu-9 Dec, 9.45 to 10.30am

Rui Paulo da Silva Martins

*Professor in Electrical and Electronics Engineering, University of Macau, China
Vice-Rector (Research)*

Michael K. Badawy

*Professor of Management of Technology and Strategic Management, Virginia Tech University, USA
Michael K. Badawy is currently Editor-in-Chief, Journal of Engineering and Technology Management.*

Chung-Yee Lee

Chair Professor of the Industrial Engineering and Logistics Management Department at the Hong Kong University of Science & Technology, Hong Kong

Chung-Yee Lee served as the Editor for IIE Transactions on Scheduling and Logistics and currently he serves as associate editor of Operations Research, Journal of Scheduling, Naval Research Logistics, and Production and Operations Management among others.

Yangming Li

Professor of Department of Electromechanical Engineering, University of Macau, Macau

Prof. Yangming Li is a Technical Editor of IEEE/ASME Transactions on Mechatronics, Associate Editor of IEEE Transactions on Automation Science Engineering, Editor of Chinese Journal of Mechanical Engineering and serves on the editorial board of a number of other international journals.

Stephen T Newman

*Professor of Innovative Manufacturing Technology, University of Bath, UK
Editor-in-Chief of the International Journal of Computer Integrated Manufacturing*

Session Schedules

Decision Analysis & Methods (1)

8/12/2010 11:00 - 12:30
Room: NAPLES 2703

Chairs: Krzysztof Ostaszewski
Mubarak Almutairi

Abstracts: see page 46

- **Pricing Insurance Contracts and Determining Optimal Capital of Insurers**
Hong Mao¹, Krzysztof Ostaszewski²
¹Shanghai Second Polytechnic University, China
²Illinois State University, United States
- **Two-Decision-Maker Cooperative Games with Fuzzy Preferences**
Mubarak Almutairi¹
¹Hafr Albatin Community College, Saudi Arabia
- **An Integrated Fuzzy Multi-criteria Decision Making Approach for Realizing the Practice of Quality Function Deployment**
Chih-Hsuan Wang¹
¹National Chiao Tung University, Taiwan
- **An Empirical Analysis of Elicited Weights in AHP**
Céline Verly¹, Karim Lidouh¹, Yves De Smet¹
¹Université Libre de Bruxelles, Belgium
- **Overall Weighting Equipment Effectiveness**
Ratapol Wudhikarn¹
¹Chiang Mai University, Thailand
- **Diversity of Feature Selection Approaches Combined with Distinct Classifiers**
Feng-Chia Li¹, Peng-Kai Wang², Cho Hua Yeh³
¹Jen Teh Junior College, Taiwan
²Hwa Hsia College, Taiwan
³Tsing Hua University, Taiwan

Decision Analysis & Methods (2)

8/12/2010 13:30 - 15:00
Room: NAPLES 2703

Chairs: Prasanta Deb
Mei-Chen Lo

Abstracts: see page 47

- **A Dynamic Differential Evolution Algorithm for Mixed Logit Discrete Choice Model Estimation**
Songlin Chen¹, Youbang Zhang¹, Xiaojin Zhang¹, Jianxin Jiao²
¹Nanyang Technological University, Singapore
²Georgia Institute of Technology, United States
- **A Decision Making Method for Selection of Finish Process for a Cylindrical Surface**
Varinder Singh¹, Vishnu Prakash Agarwal², Prasanta Deb¹
¹Bits Pilani K K Birla Goa Campus, India
²Thapar University, India
- **A Decision Analysis on the Optimal Timing Under the Uncertain Cost of Urban Logistics**
Tyrone T. Lin¹, Chun-Chen Shih²
¹National Dong Hwa University, Taiwan
²National Chengchi University, Taiwan
- **The Decision Analysis of Market Entry with Game Options Concept**
Tyrone T. Lin¹, Chia-Fang Wu¹
¹National Dong Hwa University, Taiwan
- **Using Multiple Criteria Decision Analysis for Supporting Decisions of Business Process Management**
Ana Carolina Campos¹, Adiel Almeida¹
¹Federal University of Pernambuco, Brazil
- **Spatial Detection of Manufacturing Shift in Mean**
Chen-ju Lin¹, Chen-yu Lin¹, Yen-ting Chen¹
¹Yuan Ze University, Taiwan

Decision Analysis & Methods (3)

8/12/2010 15:30 - 17:15
Room: NAPLES 2703

Chairs: Kwa-Sang Chin
Jin Han Park

Abstracts: see page 48

- **What Affects the Decision-making Consumers Consumption of Luxury Goods: An Evidence Case from China**
Yong Zhang¹, Jikun Fang¹, Hao Zhang¹, Zheng Cui¹, Xiaojuan Fan¹
¹Beijing Technology and Business University, China
- **Analysis of Competitive Advantages - Approach of Transnational Interregional I-O Table**
Mei-Chen Lo¹, Toshimasa Osaki², Martin Drozda³, Gwo-Hshiung Tzeng⁴
¹National United University, Taiwan
²Nagoyagakuin University, Japan
³Leibniz University of Hannover, Germany
⁴National Chiao Tung University, Taiwan
- **Advanced Sales and Operations Planning Based on Integration of Physical and Financial Flows**
Jun-Zhong Wang¹, Ping-Yu Hsu¹
¹National Central University, Taiwan
- **Ranking of Product Alternatives Based on Customer-Designer Preferences**
Sanjaykumar Gangurde¹, Milind Akarte²
¹K.K.Wagh Institute of Engineering Education and Research, India
²National Institute of Industrial Engineering, India
- **A Preliminary Study on Design and Development of Template-Based for License Plate Recognition System Applying Artificial Coordinates Auxiliary Techniques**
Bih-Yaw Shih¹, Chen-Yuan Chen², Jin-Wei Kuo¹, Po-Wei Chen¹, Tsung-Hao Chen³, Po-Hsuan Huang¹, Pei-Yin Chung⁴, Wan-I Lee²
¹National Pingtung University of Education, Taiwan
²National Kaohsiung First University of Science and Technology, Taiwan
³Shu-Te University, Taiwan
⁴Meiho University, Taiwan
- **Interactive Permutation Decision Making Based on Genetic Algorithm**
Mahdi Bashiri¹, Majid Jalili¹
¹Shahed University, Iran
- **Coastal Vulnerability to Sea Level Rise: A Spatio-temporal Decision Making Tool**
Oz Sahin¹, Sherif Mohamed¹
¹Griffith University, Australia

Technology & Knowledge Management (1)

8/12/2010 11:00 - 12:30
Room: NAPLES 2603

Chairs: Prattana Punnakitkashem
Poul Kyvsgaard Hansen

Abstracts: see page 49

- **Does Internet Self-Efficacy Affect Knowledge Sharing Behavior?**
Pei-Lee Teh¹, Jessica Sze-Yin Ho¹,
Chen-Chen Yong², Siew-Yong Yew²
¹Multimedia University, Malaysia
²University of Malaya, Malaysia
- **Detecting the Valley of International Academic Collaboration in Renewable Energy**
Hajime Sasaki¹, Yuya Kajikawa¹, Kenzo Fujisue², Ichiro Sakata¹
¹The University of Tokyo, Japan
²Waseda University, Japan
- **Technology Acquisition in Functional Chemicals - An Empirical Study on Phase Difference Film**
Takashi Yukita¹, Hiroshi Osada²
¹Mitsui Chemicals, INC., Japan
²Tokyo Institute of Technology, Japan
- **A Correlation Analysis on Service Innovation and Management for the International Roaming Inbound Business**
Chia-Chi Lee¹, Ta-Hui Yang², Tyrone T. Lin³
¹National Taipei College of Business, Taiwan
²Chunghwa Telecom Co., Ltd., Taiwan and
National Dong Hua University, Taiwan
³National Dong Hua University, Taiwan
- **An Efficient Development Process for an Innovative Transport Unit**
Sebastian Jursch¹, Sylwia Jalocho¹,
Eckart Hauck¹, Sabina Jeschke¹, Klaus Henning¹
¹RWTH Aachen University, Germany
- **Knowledge Sources, Innovative Activity and the Performance of UK New Technology Based Firms**
Panagiotis Ganotakis¹, Jim Love¹
¹Aston University, United Kingdom

Technology & Knowledge Management (2)

8/12/2010 13:30 - 15:00
Room: NAPLES 2603

Chairs: Chui Young Yoon
Panagiotis Ganotakis

Abstracts: see page 50

- **Mapping the Relations Between Technology, Product, and Service: Case of Apple Inc.**
Woori Han¹, Yongtae Park¹
¹Seoul National University, South Korea
- **Create a Proactive Knowledge Sharing Platform Through Specific Supplier Network and Location Investment**
Tung-Hsien Chen¹
¹National ChengChi University, Taiwan
- **Profiling Chinese Nano-Biomedical Science in a Decade**
Ruimin Pei¹, Alan Porter², Peng Gao¹
¹Chinese Academy of Sciences, China
²Georgia Institute of Technology, United States
- **The Interrelationship Among Learning Environment, Knowledge Process and New Product Development Performance**
Ningning Jing¹, Chen Yang¹
¹Hohai University, China
- **A Method for Assessing Patent Similarity Using Direct and Indirect Citation Links**
Hsiao-Chung Wu¹, Hung-Yi Chen¹,
Kung-Yen Lee², Ying-Chieh Liu¹
¹Chaoyang University of Technology, Taiwan
²National Taiwan University, Taiwan
- **Inter-organizational Knowledge Transfer Effectiveness in New Technology-Based Firms: A Relational and Empirical View from South Africa**
Kai-Ying Chan¹, Leon Oerlemans²,
Marthinus Pretorius¹
¹University of Pretoria, South Africa
²Tilburg University, Netherlands

Technology & Knowledge Management (3)

8/12/2010 15:30 - 17:15
Room: NAPLES 2603

Chairs: Dotun Adebajo
Hung-Yi Chen

Abstracts: see page 51

- **Application of Production Management Principles to Engineering Processes: An Explorative Study**
Johannes Hinckeldeyn¹, Rob Dekkers²,
Jochen Kreutzfeldt¹
¹Hamburg University of Applied Science, Germany
²University of the West of Scotland, United Kingdom
- **Challenges and Approaches to Customer Development in Co-located High-tech Start-ups**
Dotun Adebajo¹
¹University of Liverpool, United Kingdom
- **Measuring Individual IT Capability to Efficiently Perform Business Tasks in an Enterprise IT Environment**
Chui Young Yoon¹, Jae Soo Yoo², Young Ju Bae², Soon Suk Chung², Ji Chul You²,
Seung Kweon Hong²
¹Chungbuk National University, South Korea
²Chungju National University, South Korea
- **An Incremental Approach to Support Realization of Modularization Benefits**
Poul Kyvsgaard Hansen¹, Hongyi Sun²
¹Aalborg University, Denmark
²City University of Hong Kong, Hong Kong
- **A Framework to Analyze Different Intellectual Property Systems**
Jiang Wei¹, Xiaolei Kong¹
¹Zhejiang University, China
- **A Systematic Approach to Design a Knowledge Transfer Framework for Process Improvement Projects**
Charalampos Daniilidis¹, Thomas Lamberstorfer¹, Rafael Kirschner¹,
Andreas Kain¹, Udo Lindemann¹
¹Technische Universitaet Muenchen, Germany

Supply Chain Management (1)

8/12/2010 11:00 - 12:30
Room: NAPLES 2702

Chairs: William Ho
Ruhul Sarker

Abstracts: see page 52

- **Strategic Capabilities of Japanese Independent Suppliers**
Kiminori Gemba¹
¹*Ritsumeikan University, Japan*
- **A Value-oriented Model for Managing Service Supply Chains**
T. He¹, William Ho¹, X.F. Xu²
¹*Aston University, United Kingdom*
²*Harbin Institute of Technology, China*
- **A Recovery Model for an Economic Production Quantity Problem with Disruption**
Hawa Hishamuddin¹, Ruhul Sarker¹, Daryl Essam¹
¹*University of New South Wales at the Australian Defence Force Academy, Australia*
- **Analysis of Capacity and Cost Heterogeneity in a Vendor Base**
Jishnu Hazra¹, B. Mahadevan¹
¹*Indian Institute of Management, India*
- **Asset Prioritization as a Modal Integrator in Organizational Logistics Activities**
Rodrigo Macedo¹, Kelly Macedo², Assed Haddad³
¹*Brazilian Army, Brazil*
²*Fluminense Federal University, Brazil*
³*Federal University of Rio de Janeiro, Brazil*
- **Dynamic Multi-modal Transportation Problem**
Suk-Chul Rim¹, Ikju Jang¹
¹*Ajou University, South Korea*

Supply Chain Management (2)

8/12/2010 13:30 - 15:00
Room: NAPLES 2702

Chairs: Chun-Mei Lai
Jun-Der Leu

Abstracts: see page 53

- **Global Supply Network Configuration Considering the Application of Free Trade Zones and Industrial Parks: A Decision Model and Application Case**
Yu-Tsung Huang¹, Jun-Der Leu¹, Chih-Hao Wen¹
¹*National Central University, Taiwan*
- **Minimizing Bullwhip Effect in Supply Chains**
Truong Ton Hien Duc¹, Huynh Trung Luong², Yeong-Dae Kim³
¹*Singapore Institute of Manufacturing and Technology, Singapore*
²*Asian Institute of Technology, Thailand*
³*Korea Advanced Institute of Science and Technology, South Korea*
- **Optimizing Short-Life-Product Replenishment Policy Considering Random Purchase Cost Increase and Incentive-Dependent Selling Rate**
Chun-Jen Chung¹, Hui-Ming Wee²
¹*Aletheia University, Taiwan*
²*Chung Yuan Christian University, Taiwan*
- **A Supply Chain Performance Measurement Improved with Integrated Methods FDSM, MOO and DEA Part I: A Conceptual of Performance Measurement Framework in Thailand: Frozen Shrimp Chains**
Sirirat Pungchompoo¹, Apichat Sopadang¹
¹*Chiang Mai University, Thailand*
- **The Influence of Total Quality Management, Concurrent Engineering and Knowledge Management in a Semiconductor Manufacturing Firm**
Poh Kiat Ng¹, Gerald Guan Gan Goh¹, Uchenna Eze¹
¹*Multimedia University, Malaysia*

Supply Chain Management (3)

8/12/2010 15:30 - 17:15
Room: NAPLES 2702

Chairs: Chandra K Jaggi
Chih-Cheng Chen

Abstracts: see page 54

- **Toward a Resilient Supply Chain with Supply Disturbances**
Ana Paula Barroso¹, Virginia Machado¹, Ana Rita Barros¹, Virgilio Cruz-Machado¹
¹*Universidade Nova de Lisboa, Portugal*
- **Waste Electrical and Electronic Equipment Management. A Case Study**
Virginia Machado¹, Ana Paula Barroso¹, Ana Rita Barros¹, Virgilio Cruz-Machado¹
¹*Universidade Nova de Lisboa, Portugal*
- **Effective Inventory Management of PCBA Production for Mobile Devices**
Weidong Lin¹
¹*Temasek Polytechnic, Singapore*
- **Implementation of Green Supply Chain Management in Uncertainty**
Chih-Cheng Chen¹, Ming-Lang Tseng², Yuan-Hsu Lin¹, Zeng Sheng Lin¹
¹*MingDao University, Taiwan*
²*Lung Hua University of Science and Technology, Taiwan*
- **Using QFD to Analyse Demand Chain Management in China for European Winery**
Haitao Wen¹, Jian Tong², Xuemei Fan¹, Sebastian Kummer²
¹*Jilin University, China*
²*Vienna University of Economics and Business Administration, Austria*
- **Channel Coordination Through Discount Pricing Policies When Demand Is Price and Effort Dependent**
Yao Yu Wang¹, Hon Shiang Lau¹
¹*City University of Hong Kong, Hong Kong*

Production Planning & Control (1)

8/12/2010 11:00 - 12:30
Room: NAPLES 2602

Chairs: Yongzhong Wu
Suksan Prombanpong

Abstracts: see page 55

- **Optimization of Group Scheduling Using Simulation with The Meta-heuristic Extended Great Deluge (EGD) Approach**
A. Ben Mosbah¹, Thien-My Dao¹
¹ETS/University of Quebec, Canada
- **Determination of the Pareto-optimal Build Orientations in Stereolithography**
John Giannatsis¹, Vassilis Canellidis¹,
Vassilis Dedoussis¹
¹University of Piraeus, Greece
- **A Hybrid Neural Network- Meta Heuristics Approach for Permutation Flow Shop Scheduling Problems**
Radha Ramanan Thiagarajan¹, Sarang Kulkarni¹, Sridharan R¹
¹National Institute of Technology Calicut, India
- **Worst Case Performance Scheduling Facing Uncertain Disruption in a Continuous Casting Process**
Purit Thanakijkasem¹, Kiatkajohn Worapradya¹
¹King Mongkut's University of Technology Thonburi, Thailand
- **A Niche Genetic Algorithm for Two-machine Flowshop Scheduling with Family Sequence-dependent Setup Times and a Common Due Window**
Meng-Chang Wang¹, Yunqing Rao¹, Kun-Peng Wang¹
¹Huazhong University of Science and Technology, China
- **Multiple Model Predictive Control of Nonlinear pH Neutralization System**
Ayman Hermansson¹, Syafie Syafie², Samsul Mohd Noor²
¹SEGi University College, Malaysia
²University Putra Malaysia, Malaysia

Information Processing & Engineering (1)

8/12/2010 13:30 - 15:00
Room: NAPLES 2602

Chairs: Suthep Butdee
Tingting Zhao

Abstracts: see page 56

- **Rule Based Business Process Optimization**
Mohamad Aghdasi¹, Ehsan Malihi¹
¹Tarbiat Modares University, Iran
- **Improving Users Satisfaction by Using Requirements Engineering Approaches in the Conceptual Phase of Construction Projects: The Elicitation Process**
Cyril Mauger¹, Thomas Schwartz¹, Jean-Yves Dantan², Lahcene Harbouché¹
¹Public Research Center Henri Tudor, Luxembourg
²Arts et Métiers ParisTech, France
- **Product Model-based Design Process Modeling in Collaborative Design**
Xu Zhang¹, Yadong Sun¹, Lijuan Wang², Dehao Xu³
¹Beijing Institute of Technology, China
²Beijing University of Chemical Technology, China
³Nanjing Institute of Electronic Technology, China
- **Applying Fuzzy Sets for ERP Systems Selection within the Construction Industry**
Marco Barreiros¹, Antonio Grilo², Virgilio Cruz-Machado², Maria do Rosário Cabrita²
¹YKK, Portugal
²Universidade Nova de Lisboa, Portugal
- **Positive Infusion of Propofol Drug During Induction**
Syafie Syafie¹, Mustapha Ait Rami², Fernando Tadeo²
¹University Putra Malaysia, Malaysia
²University of Valladolid, Spain
- **A Novel Digit Serial Dual Basis GF(2m) Multiplier**
Po-Lun Chang¹, Fei-Hu Hsieh¹, Horng-Lin Shieh²
¹Lunghwa University of Science and Technology, Taiwan
²Saint John's University, Taiwan

Information Processing & Engineering (2)

8/12/2010 15:30 - 17:15
Room: NAPLES 2602

Chairs: Yaoguang Hu
Xu Zhang

Abstracts: see page 57

- **Creative Design of Solar Energy Portable Lamp Based on Product Gene and Intuition Models**
Ting-ting Zhao¹, Zhenhe Ju¹, Xiao-peng Wei², Xiao-xiao Li³
¹Shenyang Institute of Engineering, China
²Dalian University, China
³Liaoning Solar Energy R&D CO., LTD, China
- **A New Filter Feature Selection Approach for Customer Churn Prediction in Telecommunications**
Ying Huang¹, Bingquan Huang¹, Tahar Kechadi¹
¹University College Dublin, Ireland
- **Model Building of Coordination Theory: A Review**
Xiaoming Hu¹, Qiang Lu¹
¹Shenzhen Graduate School, Harbin Institute of Technology, China
- **Function-Based Patent Retrieval for Concept Design**
Hongtao Wu¹, Haobo Yang¹, Jianhong Ma¹, Runhua Tan¹
¹Hebei University of Technology, China
- **Robust Tool for Feature Extraction and Its Application**
Pawel Blaszczyk¹
¹University of Silesia, Poland
- **Identifying a New Service Opportunity from Potential Needs: User-centric Service Map**
Jieun Kim¹, Yongtae Park¹
¹Seoul National University, South Korea

Operations Research (1)

8/12/2010 11:00 - 12:30
Room: NAPLES 2701

Chairs: Yuri Popkov
Chuangyin Dang

Abstracts: see page 58

- **Ranking Alternative Production Scenarios Using Super-Efficiency Analysis**
Stella Sofianopoulou¹
¹University of Piraeus, Greece
- **Complexity and Approximability Results for Robust Knapsack Problems**
Fabrice Talla Nobibon¹, Roel Leus¹
¹Katholieke Universiteit Leuven, Belgium
- **A Shortest Path Problem with Random and Interval Variables for Arcs Based on Conditional Value at Risk**
Takashi Hasuike¹
¹Osaka University, Japan
- **The Development on Obstacle Avoidance Design for a Humanoid Robot Based on Four Ultrasonic Sensors for the Learning Behavior and Performance**
Ya-Ju Li¹, Wei Chung Chou¹, Chen-Yuan Chen², Bih-Yaw Shih¹, Lien-Tung Chen³, Pei-Yin Chung⁴
¹National Pingtung University of Education, Taiwan
²National Kaohsiung First University of Science and Technology, Taiwan
³Yung-Ta Institute of Technology and Commerce, Taiwan
⁴Meiho University, Taiwan
- **A Performance Management on Automobile Dealers with Applying Data Envelopment Analysis**
Tyrone T. Lin¹, Chia-Chi Lee², Fei-Ting Chang¹
¹National Dong Hwa University, Taiwan
²National Taipei College of Business, Taiwan
- **Mixed Integer Programming Formulation for Hybrid Flow Shop Scheduling Problem**
Mohamed K. Omar¹, Siew Chein Teo², Yasothai Suppiah²
¹University Technical Melaka, Malaysia
²Multimedia University, Malaysia
- **Application of Simulated Annealing on Least-Cost Design of Sewer Network**
Shuang-Fu Yeh¹, Yao-Jen Chang¹, Min-Der Lin¹
¹National Chung Hsing University, Taiwan

Service Innovation & Management (1)

8/12/2010 13:30 - 15:00
Room: NAPLES 2701

Chairs: Yuya Kajikawa
Chien-Liang Kuo

Abstracts: see page 59

- **Analyzing Service Quality in Thai Hotel Industry: An Application of the SERVQUAL Model**
Sakun Boon-itt¹, Vornsupa Chomvong²
¹Thammasat Business School, Thailand
²PricewaterhouseCoopers, Thailand
- **A Novel RFID Application for Realizing Lean Services Based on Customer Chain Operations Reference Model**
Stuart So¹
¹City University of Hong Kong, Hong Kong
- **Creating an Academic and Technological Landscape of Service Innovation: An Analysis of the Citation Network**
Naoki Shibata¹, Yuya Kajikawa¹, Junichiro Mori¹, Ichiro Sakata¹
¹The University of Tokyo, Japan
- **Development of Technology Roadmap for Product-Service System (TRPSS)**
Youngjung Geum¹, Yongtae Park¹
¹Seoul National University, South Korea
- **Fuzzy Measures for Service Quality of Fuzzy Numbers**
Cheng-Che Chen¹, Chun-Mei Lai¹, Hsu-San Liu¹
¹Far East University, Taiwan
- **Development of Two-layered Service Evolution Map: Structure and Development Process**
Bomi Song¹, Daekook Kang¹, Byungun Yoon², Yongtae Park¹
¹Seoul National University, South Korea
²Dongguk University-Seoul, South Korea

Service Innovation & Management (2)

8/12/2010 15:30 - 17:15
Room: NAPLES 2701

Chairs: Zheng Cui
Stuart So

Abstracts: see page 60

- **How Trust Links the Association Connecting Use Experience, Word-of-Mouth with Use Intention and Use Behavior - A Case Study on the Service Innovation in the Aesthetic Medical Treatment**
Shuo-Chang Tsai¹, Yung-Hsin Chen², Ling-Yu Chang³
¹Asia University, Taiwan
²National Cheng Kung University, Taiwan
³China Medical University Hospital, Taiwan
- **An Exploration of Service Quality Practices in the Chinese Hotel Industry - A Comparison between CMHs and FMHs**
Zheng Cui¹, Haoxiang Yang¹, Suyuan Zhang²
¹Beijing Technology and Business University, China
²Peking University, China
- **Impact of Waiting Time on Tourists Satisfaction in a Theme Park: An Empirical Investigation**
Wenli Li¹
¹Jinan University, China
- **A Two-Stage Discretionary Priority Service System with Markovian Arrival Inputs**
Ning Zhao¹, Zhaotong Lian¹
¹University of Macau, China
- **iSIM: A Proposed Methodology for Industrial-oriented Service Innovation**
Chien-Liang Kuo¹, Chao-yin Chi², Huey-Jiuan Yeh²
¹Chinese Culture University, Taiwan
²Industrial Technology Research Institute, Taiwan
- **Service Science: An Analysis of the Business System of Product Service Companies**
Noriyuki Shikata¹, Kiminori Gemba², Keisuke Uenishi¹
¹Osaka University, Japan
²Ritsumeikan University, Japan
- **Evaluation of PSS Concepts for Successful Shift from Product to PSS: An Approach Based on AHP and Niche Theory**
Sora Lee¹, Yongtae Park¹
¹Seoul National University, South Korea

Quality Control & Management (1)

8/12/2010 11:00 - 12:30
Room: NAPLES 2601

Chairs: Lianjie Shu
Chen-Ju Lin

Abstracts: see page 61

- **Evaluation of Production Yield for Process Selection**
Chen-ju Lin¹, Hsin-hui Kuo¹
¹*Yuan Ze University, Taiwan*
- **Simultaneously Considered the Properties of Cost and Quality for a Control Chart Design with a Gamma Shock Model and Correlated Data**
Peng-Kai Wang¹, Cho Hua Yeh²,
Feng-Chia Li³
¹*Hwa Hsia College, Taiwan*
²*Tsing Hua University, Taiwan*
³*Jen Teh Junior College, Taiwan*
- **Weighted CUSUM Procedures for Surveillance of Health Events with Varying Population Sizes**
Lianjie Shu¹, Wei Jiang², Kwok-Leung Tsui³
¹*University of Macau, Macau*
²*The Hong Kong University of Science and Technology, Hong Kong*
³*Georgia Institute of Technology, United States*
- **Medical Equipment (DXA) Reliability and the Management of Its Quality Control by the Clinical User**
Jan Pieter Clarys¹, Aldo Scafoglieri¹,
Steven Provyn¹, Olivia Louis², Joanne Wallace³, Jonathan Tresignie¹, Johan De Mey¹
¹*Vrije Universiteit Brussel, Belgium*
²*Brussels University Hospital, Belgium*
³*University of Aberystwyth, United Kingdom*
- **Application of XML for Manufacturing Quality Information Representation Based on STEP**
Xianlong Xu¹, Shurong Tong², Xinwei Zhang³, Xin Shi², Shiwang Hou⁴
¹*Xi'an Technological University, China*
²*Northwestern Polytechnical University, China*
³*University of Toulouse, France*
⁴*North University of China, China*
- **Application of QFD in Digital Electronics Industry**
Mahmood Ul Hassan¹, Ahmer Tajammul¹, Muhammad Asim²
¹*National University of Sciences and Technology, Pakistan*
²*Center for Advance Studies in Engineering, Pakistan*

Human Factors (1)

8/12/2010 13:30 - 15:00
Room: NAPLES 2601

Chairs: Jianwei Niu
Toraj Mojibi

Abstracts: see page 62

- **Only Room for an Ideas Man - or Is There More to CI for the Less Creative?**
Helen Wagner¹, Sue Morton¹, Chris Backhouse¹
¹*Loughborough University, United Kingdom*
- **Problem-Identification Workshop as a Future-Oriented Macroergonomic Tool for Managing the Work Environment**
Mohammed-Aminu Sanda¹, Ylva Fältholm¹, Lena Abrahamsson¹, Jan Johansson¹
¹*Luleå University of Technology, Sweden*
- **Foot Measurements from 2D Digital Images**
Shuping Xiong¹, Yulin Li¹, Yi Zhu¹,
Jingxing Qian¹, Dong Yang²
¹*Shanghai Jiao Tong University, China*
²*Donghua University, China*
- **Designing Lifting Task in Shoe Industry using Genetic Algorithm**
Sanjay Srivastava¹, Kamal Srivastava¹,
Swati N¹, Yogesh Anand¹, V. Soamidas¹
¹*Dayalbagh Educational Institute, India*
- **Measuring Member Performance in Multi-functional R&D Teams: An Empirical Study with GAHP Analysis**
Jie Zhu¹, Shuang Chen¹, Qiang Lu¹
¹*Shenzhen Graduate School, Harbin Institute of Technology, China*
- **Structural Analysis of Approaches for Worker Participation**
Uwe Dombrowski¹, Tim Mielke¹, Sven Schulze¹
¹*Technische Universität Braunschweig, Germany*

Human Factors (2)

8/12/2010 15:30 - 17:15
Room: NAPLES 2601

Chairs: Masahiro Aruga
Zhizhong Li

Abstracts: see page 63

- **Studying Into Relationship Between Strategy and Organizational Structure at Power Distribution Company for Tehran Province Districts**
Toraj Mojibi¹, Mona Milani¹, Yasaman Khalili², Soheil Khorshidi³
¹*Islamic Azad University, Iran*
²*Payame Noor University, Iran*
³*Ministry of Education, Iran*
- **A Modeling Consideration of the Latent Characters of the Information System and Amounts based on the Philosophical and Nervous Elements**
Masahiro Aruga¹, Masayuki Aruga²
¹*Tokai University, Japan*
²*The Open University of Japan,*
- **Examining the Mediating Effect of Innovative Culture in the Relationship Between Leadership and Knowledge-based Customer Relationship Implementation**
Andy, Li Yueh Chen¹
¹*MingDao University, Taiwan*
- **Sonar-based Obstacle Avoidance Using a Path Correction Method for Autonomous Control of a Biped Robot for the Learning Stratification and Performance**
Cheng-Hsuan Tsai¹, Po-Hsuan Huang¹,
Wei Chung Chou¹, Chia-Hung Shih¹,
Chen-Yuan Chen², Bih-Yaw Shih¹,
Chin-Jui Chang³, Cheng-Wu Chen⁴,
Tsung-Hao Chen⁵, Wan-I Lee², Pei-Yin Chung⁶
¹*National Pingtung University of Education, Taiwan*
²*National Kaohsiung First University of Science and Technology, Taiwan*
³*Transworld University, Taiwan*
⁴*National Kaohsiung Marine University, Taiwan*
⁵*Shu-Te University, Taiwan*
⁶*Meiho University, Taiwan*
- **Feature Extraction of Three Dimensional (3D) Facial Landmarks Using Spin Image**
Xin Zhang¹, Na Fan², Xiao Chen³,
Linhua Ran¹, Jianwei Niu²
¹*China National Institute of Standardization, China*
²*University of Science and Technology Beijing, China*
³*Quartermaster Research Institute, China*
- **Reducing the Risk of Heat Stress Using Artificial Neural Networks Based Job-combination Approach**
Sanjay Srivastava¹, Yogesh Anand¹, V. Soamidas¹
¹*Dayalbagh Educational Institute, India*

Manufacturing Systems (1)

8/12/2010 11:00 - 12:30
Room: SICILY 2502

Chairs: S.S. Mahapatra
Carman Ka Man Lee

Abstracts: see page 64

- **Effective Nesting of Layer Manufacturing Fabricated Parts Using a Genetic Algorithm and a Bottom-Left Ray Casting Procedure**
Vassilis Canellidis¹, John Giannatsis¹, Vassilis Dedoussis¹
¹University of Piraeus, Greece
- **Heuristic Procedure for Mixed Model Assembly Line Balancing Problem**
Venkatesh Jonnalagedda¹, Balaji Dabade¹
¹SGGS Institute of Engineering and Technology, India
- **A Web-based Collaborative QFD System to Aid Children Backpack Design**
Kevin Tseng¹, Cho-Chi Hsu¹
¹Chang Gung University, Taiwan
- **Optimization Problems Related to Triangular Pocket Machining**
Apriani Soepardi¹, Mochammad Chaeron¹, Fahryl Aini²
¹University of National Development, Indonesia
²Insan Teknologi Semesta Ltd., Indonesia
- **Grinding Path Optimization for The Roll Grinding Machine**
Apisak Phromfaity¹, Kawin Sonthipermpon¹, Erik Bohez²
¹University of Naresuan, Thailand
²Asian Institute of Technology, Thailand
- **Simultaneous Microchannel Formation and Copper Deposition on Silicon Along with Surface Treatment**
Anjali Kulkarni¹, Vijay Kumar Jain¹, K. A. Misra²
¹Indian Institute of Technology, India
²Harcourt Butler Technological Institute, India

Manufacturing Systems (2)

8/12/2010 13:30 - 15:00
Room: SICILY 2502

Chairs: Kevin Tseng
Nirjhar Roy

Abstracts: see page 65

- **Application of Hierarchical Colored Petri Net in Distributed Manufacturing Network**
Yaqiong Lv¹, Carman Ka Man Lee¹
¹Nanyang Technological University, Singapore
- **Manufacturing Cell Formation under Probabilistic Product Mix**
Madhusudanan Pillai¹, M. P. Chandrasekharan²
¹National Institute of Technology Calicut, India
²Amrita Viswa Vidya Peetham, India
- **An Improved Artificial Immune System for Solving Loading Problems in Flexible Manufacturing Systems**
Prasant Ranjan Dhal¹, Mohapatra S S¹, Saurav Datta¹, Antaryami Mishra¹
¹National Institute of Technology, India
- **A Multi-plant Tolerance Allocation Model for Assembled Electronic Products in Green Supply Chain Management**
Feng-Yi Huang¹, Yuan-Jye Tseng¹
¹Yuan Ze University, Taiwan
- **Study on Implementation Strategies of EPR-Driven Remanufacturing in China**
Yi Wu¹
¹Shanghai University, China
- **Assembly Planning of Aircraft Based on Polychromatic Sets**
Song Wang¹, Jun Hong¹, Yunlong Li¹, Yi Zhang¹, Zongbin Li¹
¹Xi'an Jiaotong University, China

Reliability & Maintenance Engineering (1)

8/12/2010 15:30 - 17:15
Room: SICILY 2502

Chairs: Jihong Yan
Ming-Der Yang

Abstracts: see page 66

- **A Checkpoint Scheme with Task Duplication Considering Transient and Permanent Faults**
Jung-Min Yang¹, Seong Woo Kwak²
¹Catholic University of Daegu, South Korea
²Keimyung University, South Korea
- **A Study of Applying the Bounded Generalized Pareto Distribution to the Analysis of Software Fault Distribution**
Chih-Song Kuo¹, Chin-Yu Huang¹
¹National Tsing Hua University, Taiwan
- **Change-Point Modeling for Software Reliability Assessment Depending on Two-Types of Reliability Growth Factors**
Shinji Inoue¹, Shigeru Yamada¹
¹Tottori University, Japan
- **Sewerage Rehabilitation Planning**
Ming-Der Yang¹, T. C. Su², Nang-Fei Pan³, P. Liu⁴
¹National Chung Hsing University, Taiwan
²National Quemoy University, Taiwan
³National Cheng Kung University, Taiwan
⁴Feng Chia University, Taiwan
- **An Investigation Into Whether the NHPP Framework Is Suitable For Software Reliability Prediction and Estimation**
Chu-Ti Lin¹, Kai-Wei Tang¹, Jun-Ru Chang², Chin-Yu Huang²
¹National Chiayi University, Taiwan
²National Tsing Hua University, Taiwan
- **Availability Assessment of a Multi-State Repairable Bubble Gum Production System**
Pardeep Gupta¹, Atul Goyal²
¹Sant Longowal Institute of Engineering & Technology, India
²Lala Lajpat Rai Institute of Engineering & Technology, India
- **Residual-based Inspection/Replacement Policy for a Deteriorating System with Markovian Covariates**
Xuejing Zhao¹, Mitra Fouladirad², Christophe Berenguer²
¹Lanzhou University, China
²Troyes University of Technology, France

Project Management (1)

8/12/2010 11:00 - 12:30
Room: SICILY 2402

Chairs: Norbert Trautmann
Luciana Alencar

Abstracts: see page 67

- **Project Scheduling with Alternative Technologies: Incorporating Varying Activity Duration Variability**
Stefan Creemers¹, Roel Leus¹, Bert De Reyck²
¹Katholieke Universiteit Leuven, Belgium
²University College London, United Kingdom
- **Preemptive Resource Constrained Project Scheduling Problem with Uncertain Resource Availabilities: Investigate Worth of Proactive Strategies**
Mohamad Fallah¹, M.Bahador Aryanezhad², Behzad Ashtiani²
¹Islamic Azad University, Iran
²Iran University of Science and Technology, Iran
- **Factors Influencing Project Quality in the Design Phase of Building Projects. A Case in the Department of Building and Engineering Services of Botswana**
Emmanuel Doodoo¹, Corro Van Waveren¹, K.Y Chan¹
¹University of Pretoria, South Africa
- **A Two-stage Stochastic Programming Model for Resource Allocation in Project Management**
Dongsheng Xu¹, Yinhua Ye¹, Yingna Lu¹, Shujin Deng¹
¹Sun Yat-sen University, China
- **Optimal Modular Design Policy for Complex Systems in Considering Coordination Costs**
Bingyin Bao¹, Suxiu Xu¹, Qiang Lu¹
¹Shenzhen Graduate School, Harbin Institute of Technology, China

Engineering Education & Training

8/12/2010 13:30 - 15:00
Room: SICILY 2402

Chairs: Fu-Man Hsieh
Seng Fat Wong

Abstracts: see page 68

- **Assessing Core Competencies and Their Training Demands for Industrial Safety and Hygiene Professional Engineers in Taiwan**
Fu-Man Hsieh¹, Yichun Yu², Y.C. Lin², Perng-Jy Tsai³
¹Wenzao Ursuline College of Languages, Taiwan
²Institute of Occupational Safety and Health, Taiwan
³National Cheng Kung University, Taiwan
- **Learning Construction Procurement Negotiation in an Educational Game**
Pei-Ru Wang¹, R. J. Dzen¹, N. F. Pan²
¹National Chiao-Tung University, Taiwan
²National Cheng Kung University, Taiwan
- **Applied RFID and Virtual Reality Technology in Professional Training System for Manufacturing**
Seng Fat Wong¹, Zhixin Yang¹, N. Cao¹, W. I. Ho¹
¹University of Macau, Macau
- **Compositive Support System and Evaluation System Study on Engineering Equipment's Use Course Management**
Yongsheng Jin¹, Guowei Wei¹, Ding Wei², Yueguo Shen³
¹Beijing University of Posts and Telecommunications, China
²Peking University, China
³PLA University of Science and Technology, China
- **Establishing an Energy Education Experience Course Program in Taiwan**
How-Gao Hsu¹, Wei-Hsien Huang¹, Hui-Yun Fu¹, Tun-Ping Teng¹
¹National Taiwan Normal University, Taiwan
- **Study of the Ability and the Education System of Professionals on Housing Maintenance Engineering**
Yunbo Xu¹, Leilei Gao¹
¹Henan Institute of Engineering, China

E-business & E-Commerce

8/12/2010 15:30 - 17:15
Room: SICILY 2402

Chairs: Zhaotong Lian
Michael Johnson

Abstracts: see page 69

- **Business Communication Experiences in the US, Mexico, and China**
Kejia Wu¹, Malini Natarajarathinam¹, Michael Johnson¹, Thanigaivel Kulandaivelu¹
¹Texas A&M University, United States
- **An Empirical Study of User Acceptance of Internet Banking: An Integration of TAM with Trust and Self-efficacy**
Hong-Lei Song¹, Shuang Wang²
¹Renmin University of China, China
²China Agricultural University, China
- **An Online Group-buying Model Based on Fuzzy Theory**
Chu-Chai Henry Chan¹, Chien-Yu Chiang¹
¹Chaoyang University of Technology, Taiwan
- **Factors Affecting the Continued Intention of Mobile Shopping**
Chuen-Roan Kang¹, Ming-Chien Hung², Shih-Ting Yang², Ting-Chu Hsieh³, Shun-ming Tang¹
¹National Yunlin University of Sciences and Technology, Taiwan
²Nanhua University, Taiwan
³WuFeng University, Taiwan
- **Customer Value of Social Network Service Website: Key Components and Impacts on Customer Loyalty**
Guozheng Zhang¹, Faming Zhou², Yong Lan²
¹Central South University, China
²Hunan Agricultural University, China
- **The Influence of Electronic Word-of-Mouth on Consumers' Quadratic Selection: Based on the Positive Research of Banks in Mainland China**
Junfeng Liao¹, Chunyan Zhong¹
¹South China University of Technology, China
- **The Implications of Virtual Reality Technology in E-commerce**
Hana Estifaei¹, Mustafa Riza¹, Hamed F. Manesh¹
¹Eastern Mediterranean University, Turkey

Poster Session 1

8/12/2010 All-Day Display
Room: SICILY 2501

- p.70 **A Memetic Algorithm for the Close-Open Mixed Vehicle Routing Problem**
Ran Liu¹, Zhibin Jiang¹, Hongtao Hu¹, Shiqing Yao¹
¹Shanghai Jiao Tong University, China
- p.70 **Development of Integrated Qualitative and Environmental Decision Method**
Ratapol Wudhikarn¹, Nopasit Chakpitak¹
¹Chiang Mai University, Thailand
- p.70 **Developing A Consumer Experience Conceptual Model for the Taiwanese Fine Food Culture in the Restaurant Industry**
Ching-Yu Lien¹, Shu-Hwa Hsiao¹, Chih-Wen Huang²
¹Minghsin University of Science and Technology, Taiwan
²Tamkang University, Taiwan
- p.70 **Calculating Lifecycle Interdependencies Based on Eco-Design Strategies**
Clemens Hepperle¹, Nikolas Bradford¹, Francesco Costantino², Robert Orawski¹, Stefan Langer¹, Udo Lindemann¹
¹Technische Universitaet Muenchen, Germany
²University of Rome "La Sapienza", Italy
- p.70 **The Relationships Between Green Consumption Cognition and Behavioral Intentions for Consumers in the Restaurant Industry**
Ching-Yu Lien¹, Yu-Shih Chen², Chih-Wen Huang³
¹Minghsin University of Science and Technology, Taiwan
²Feng Chia University, Taiwan
³Tamkang University, Taiwan
- p.70 **The Comparison Between MAUT and PROMETHEE**
Min Wang¹, S.-J. Lin¹, Y.-C. Lo¹
¹Chaoyang University of Technology, Taiwan
- p.70 **Regulatory Focus and Recovery Fit in Airline Overbooking**
Xiang Zhang¹, Peng Wang¹, Yuehui Wang¹, Guoxin Wang¹
¹Beijing Institute of Technology, China
- p.71 **Development of an Adjustable Mold Box for Making Silicone Rubber Mold**
Chil-Chyuan Kuo¹, Cheng-Yan Lin¹, Xin-Zhu Wu¹
¹Ming Chi University of Technology, Taiwan
- p.71 **A New Robust Validity Index for Fuzzy Clustering Algorithm**
Horng-Lin Shieh¹, Po-Lun Chang²
¹Saint John's University, Taiwan
²Lunghwa University of Science and Technology, Taiwan
- p.71 **Analysis of the Harmonics Losses and Bearing Load for Motorized High Speed Spindle Part I: Modeling**
Shih-Chang Chen¹, Yu-Ling Juan¹, Chia-Hui Tang¹, Ching-Feng Chang¹, Tsair-Rong Chen¹
¹National Changhua University of Education, Taiwan
- p.71 **Schedulability and Optimal Checkpoint Placement for Real-Time Multi-Tasks**
Seong Woo Kwak¹, Jung-Min Yang²
¹Keimyung University, South Korea
²Catholic University of Daegu, South Korea
- p.71 **Failure Rate Calculating Method of Components Based on the Load-strength Interference Model**
Zheng Wang¹, Zengquan Wang¹, A-na Wang²
¹National Key Laboratory of Diesel Engine Turbocharging Technology, China
²Shenyang Ligong University, China
- p.71 **Time-To-State and Availability Assessment of Multi-state Weighted K-out-of-N: G Systems**
Shahrazad Faghihroohi¹, Yanfu Li²
¹National University of Singapore, Singapore
²University of Tennessee, United States
- p.71 **Admission Control of an M/M/1 Queue with Multiple Deterioration States**
Yarlin Kuo¹
¹Yunlin University of Science and Technology, Taiwan
- p.71 **Modeling Impact of Product Variety on Performance in Mixed-model Assembly System: an Artificial Neural Network Meta-modeling Approach**
Yunqing Rao¹, Kunpeng Wang¹, Meng-Chang Wang¹
¹Huazhong University of Science and Technology, China
- p.72 **Scheduling of Television Commercials**
Min-Sun Wuang¹, Chang-Lin Yang¹, Rong-Hwa Huang¹, Shan-Ping Chuang²
¹Fu Jen Catholic University, Taiwan
²Huafan University, Taiwan
- p.72 **Bond Graph Model of a New Hydraulic Winch Test Bench on Energy Recycle**
Mengru Li¹, Baofu Xu¹, Zhixin Chen²
¹Tongji University, China
²Chinese Academy of Fishery Sciences, China
- p.72 **Flight Operation-oriented Tunnel-in-the-Sky Design**
Xuelin Huang¹, Jiangyun Wang¹
¹Beihang University, China
- p.72 **How Could Non-feasible Constraints Be Located in Predictive Control?**
Teresa Alvarez¹, Daniel Briongos¹, Monica Garcia¹
¹University of Valladolid, Spain
- p.72 **Algorithm for Obstacle Classification and Lane Line Identification Using LRF Sensors**
Hung-Yuan Chung¹, Zih-Yang Lin¹, Hong-Wei Chen¹, Hsiao-Yu Wang¹
¹National Central University, Taiwan
- p.72 **A Comparison Study of Five In-vehicle Warning Information Displays with or Without Spatial Compatibility**
Jing-Wun Jhuang¹, Yung Ching Liu¹, Yang-Kun Ou¹
¹National Yunlin University of Science and Technology, Taiwan
- p.72 **The Effects of Memory Cue and Memory Aid on Prospective Memory in Older and Younger Adults**
Min-Sheng Chen¹, Chih-Nan Wang¹
¹National Yunlin University of Science & Technology, Taiwan
- p.72 **Estimating Technical Efficiency for Global E-tailing Companies for Different Regions**
Yi-Hsing Lin¹, Chun-Fu Hong²
¹National Quemoy University, Taiwan
²National Yang-Ming University, Taiwan
- p.73 **International Liquidity, Inflation and Exchange Rate: Evidence from China**
Hongxia Ma¹, Xuefen Sun¹
¹Wuhan University, China
- p.73 **An Empirical Analysis of the Content of Chinese and American B2C Home Furniture Web Sites**
Liyi Zhang¹, Shouxian Li¹, Yun Xiao¹
¹Wuhan University, China
- p.73 **Key Factors of Online Bank Brand Choice Intention - Basing on Mainland China Online Banks**
Junfeng Liao¹, Rui Cheng², Zhongqiang Wang³
¹South China University of Technology, China
²City University, Hong Kong
³University of Warwick, United Kingdom
- p.73 **An Agent Based Negotiation Mechanism Considering Suppliers Bidding in an Automated Business Transaction**
S. Kamal Chaharsooghi¹, Zahra Taheri¹
¹Tarbiat Modares University, Iran
- p.73 **Cloud Computing for Network Business Ecosystem**
Roberto Gagliardi¹, Fausto Marcantoni¹, Alberto Polzonetti¹, Barbara Re¹, Pietro Tapanelli¹
¹University of Camerino, Italy
- p.73 **An Oligopolistic Electricity Model with Marketable CO2 Emission Permits**
William Chung¹
¹City University of Hong Kong, Hong Kong

- p.73 **The Project Management of the Profit Contribution from the Customers of Mobile Virtual Private Network Services**
Chia-Chi Lee¹, Du-Ching Lu², Tyrone T. Lin³
¹National Taipei College of Business, Taiwan
²Chunghwa Telecom Co., Ltd., Taipei, Taiwan and National Dong Hwa University, Taiwan
³National Dong Hwa University, Taiwan
- p.73 **High in Quantity and High in Storage: A Look Into the Patents Conversion in Chinese Universities**
Yang Zhou¹, Jin Chen¹
¹Zhejiang University, China
- p.74 **Examining Transactive Memory System in R&D Teams**
Chi-Cheng Huang¹, Pin-Chen Jiang²
¹Aletheia University, Taiwan
²Chang Jung Christian University, Taiwan
- p.74 **A Review of Inter-Firm Technology Transfer Through the Lens of the Resource-Based View**
Nisakorn Somsuk¹
¹Thammasat University, Thailand
- p.74 **The Interactive Effect of Knowledge Management with Organizational Citizenship Behavior on Knowledge Management Performance in Taiwan Semiconductor Industries**
Chin Ping Chen¹, His-Chi Hsiao², Ching Wei Lin³, Yong Xin Li¹
¹National Changhua University of Education, Taiwan
²Cheng Shiu University, Taiwan
³National Chiao Tung University, Taiwan
- p.74 **University-Industry Technology Transfer Programme's Success Analysis: Using the Analytic Hierarchy Process-Based Model**
Nisakorn Somsuk¹
¹Thammasat University, Thailand
- p.74 **Research on Pervasive Knowledge Service Model**
Min Yao¹, Xinghe Wu¹, Yao Yao², Yiwen Wang¹
¹Zhejiang University, China
²Hangzhou Normal University, China
- p.74 **What Leads to Differences in Success Antecedents? Analyzing the Effect of Offering Nature, Variety, and Service Mode**
Bin Xu¹, Kay Chuan Tan¹
¹National University of Singapore, Singapore
- p.74 **Theoretical Perspectives in Quality Management Implementation: A Literature Review**
Nisakorn Somsuk¹
¹Thammasat University, Thailand

Decision Analysis & Methods (4)

9/12/2010 11:00 - 12:30
Room: NAPLES 2703

Chairs: Mubarak Almutairi
Tomasz Błaszczuk

Abstracts: see page 75

- **Dynamic Linguistic Weighted Averaging Operators Applied to Decision Making**
Jin Han Park¹, Young Chel Kwun², Ja Hong Koo²
¹Pukyong National University, South Korea
²Dong-A University, South Korea
- **A Comparison of Three Forecasting Methods to Establish a Flexible Pavement Serviceability Index**
Ching-Tsung Hung¹, Shih-Huang Chen²
¹Kainan University, Taiwan
²Feng Chia University, Taiwan
- **Decision Making in House of Quality: A Hybrid AHP-PROMETHEE Approach**
Majid Behzadian¹, Reza Samizadeh², Jamshid Nazemi³
¹Shomal University, Iran
²Alzahra University, Iran
³Azad University, Iran
- **Restaurant Location Selection by Utilizing the Fuzzy Preference Relations**
Tsung-Han Chang¹
¹Kao-Yuan University, Taiwan
- **Is China's Voluntary Action on Carbon Intensity Cut Too Ambitious?**
Hongliang Yang¹, Dan Shi²
¹Asian Development Bank, Philippines
²Chinese Academy of Social Sciences, China
- **Fuzzy Approaches to Two-Decision-Maker Games**
Mubarak Almutairi¹
¹Hafr Albatin Community College, Saudi Arabia

Decision Analysis & Methods (5)

9/12/2010 13:30 - 15:00
Room: NAPLES 2703

Chairs: Chih Wang
Majid Jalili

Abstracts: see page 76

- **An Evaluation Methodology for Binary Pattern Classification Systems**
Chih-Fong Tsai¹
¹National Central University, Taiwan
- **On the Use of Multi-criteria Decision Aid Tools for the Efficient Design of 3D-stacked Integrated Circuits: A Preliminary Study**
Anh Vu Doan¹, Yves De Smet¹, F. Robert¹, Dragomic Milojevic¹
¹Université Libre de Bruxelles, Belgium
- **Investigation on the Improvement of Operational Performance of Soeu's in India Using Dea Based Malmquist Index**
Meenakumari Ramachandran¹, R Subasri¹, S Jayamani², N Kamaraj³
¹Kongu Engineering College, India
²Pavai Engineering College, India
³Thiagarajar College of Engineering, India
- **A Note to TOPSIS Method in MADM Problems Under Fuzzy Environment**
Zhi Pei¹, Li Zheng¹
¹Tsinghua University, China
- **Characterizing Triggers of Reactive Cycles within Design Processes Based on Process Observation**
Arne Herberg¹, Stefan Langer¹, Florian Netter¹, Udo Lindemann¹
¹Technische Universität München, Germany
- **Utilization of Data Mining on Asset Management of Freeway Flexible Pavement**
Po-Hsun Sung¹, Jyh-Dong Lin¹, Shih-Huang Chen², Shun-Hsing Chen³, Jr-Hung Peng¹
¹National Central University, Taiwan
²Feng Chia University, Taiwan
³Taiwan Area National Freeway Bureau, Taiwan
- **Building Fuzzy Random Objective Function for Interval Fuzzy Goal Programming**
Arbaiy Nureize¹, Junzo Watada¹
¹Waseda University, Japan

Decision Analysis & Methods (6)

9/12/2010 15:30 - 17:15
Room: NAPLES 2703

Chairs: Majid Behzadian
Xuenzheng Zhang

Abstracts: see page 77

- **A Cost and Space Efficient Method for Unbalanced Assignment Problems**
Anupong Iampang¹, Veera Boonjing¹, Pisit Chanvarasuth²
¹King Mongkut's Institute of Technology Ladkrabang, Thailand
²Sirindhorn International Institute of Technology, Thailand
- **The Effects of Feature Selection and Model Selection on the Correctness of Classification**
ShuChuan Lo¹
¹National Taipei University of Technology, Taiwan
- **A Case Study of Evaluating Supplier's Selection Criteria in a Steel Bars Manufacturer**
Yun-Ning Liu¹
¹University of Dong Hua, Taiwan
- **A Study on Revenue Management of Taiwan High Speed Railway**
Hsiao-min Chuang¹, Chihpeng Chu¹, Wei-Feng Niu²
¹National Dong-hwa University, Taiwan
²G5 Capital Management, Ltd., Taiwan
- **A Fuzzy Logic-Based Evaluation Method for Idea Screening of Product Design**
Yao-Tsung Ko¹, Ping-Hong Kuo¹
¹Tunghai University, Taiwan
- **Predictive Modeling of High-Performance Concrete with Regression Analysis**
Shanshan Wu¹, Libei Zhi¹, Jianguo Yang¹, Sanjay Shukla²
¹Donghua University, China
²University of Texas at San Antonio, United States
- **Regional Industrial Energy Efficiency Research Under the Low-carbon Economy Target**
Yuanying Chi¹, Yuanqin Chi², Dongxiao Niu¹, Zhi Liu¹
¹North China Electric Power University, China
²Longkou Liangjia Coal Mine, China

Technology & Knowledge Management (4)

9/12/2010 11:00 - 12:30
Room: NAPLES 2603

Chairs: Uchenna Cyril Eze
Yuya Kajikawa

Abstracts: see page 78

- **Developing Coherency Matrix to Support Design Changes of Complex Product**
Nattawut Janthong¹, Suthep Butdee¹
¹King Mongkut's University of Technology North Bangkok, Thailand
- **Determinants of Knowledge Search Strategy of Chinese SMEs**
Fang Luo¹
¹Zhejiang University, China
- **Performance Assessment of Technology Transfer Project: An Application of DEA Technique**
Prattana Punnakitkashem¹, Patarapong Intarakumnerd², Tritos Laosirihongthong²
¹Mahidol University, Thailand
²Thammasat University, Thailand
- **Determining Enabling Factors of University Technology Business Incubation Program: Resource-Based View Theory**
Nisakorn Somsuk¹, Prattana Punnakitkashem², Tritos Laosirihongthong¹
¹Thammasat University, Thailand
²Mahidol University, Thailand
- **A Conceptual Framework of Cluster Innovation Mechanism Based on Network Theory: A Case of Dalian Software Park in China**
Weilin Zhao¹
¹Waseda University, Japan
- **Building Environmental Assessment as a Knowledge Management Tool Driving Society**
Yuya Kajikawa¹, Toshihiro Inoue¹
¹The University of Tokyo, Japan

Technology & Knowledge Management (5)

9/12/2010 13:30 - 15:00
Room: NAPLES 2603

Chairs: Tritos Laosirihongthong
Dotun Adebajo

Abstracts: see page 79

- **Technological Regime and Knowledge Productivity: An Industry-level Analysis of Chinese Manufacturing**
Bin Guo¹, Xiaoling Chen¹
¹Zhejiang University, China
- **Missing Link Between Knowledge Management and Organizational Performance---Empirical Evidence in Taiwan**
Chi-Chuan Wu¹, Shu-Hsien Liao², Wen-Jung Chang², Retno Widowati², Da-Chian Hu²
¹Tatung University, Taiwan
²Tamkang University, Taiwan
- **A Novel Technique for Measuring the Technology Application on CNG Industry of Pakistan**
Jawwad Hassan¹, Naeha Sharif¹, Muhammad Asim²
¹National University of Sciences and Technology, Pakistan
²Center for Advance Studies in Engineering, Pakistan
- **Global Trends and Rapid Growth of East Asia in IEEE Publications**
Nobuyuki Shirakawa¹, Minoru Nomura¹, Kumi Okuwada¹, Takao Furukawa¹
¹National Institute of Science and Technology Policy, Japan
- **Leveraging Knowledge Management with the Balanced Scorecard**
Maria do Rosário Cabrita¹, Virgilio Cruz-Machado¹, Antonio Grilo¹
¹Universidade Nova de Lisboa, Portugal
- **An Approach to New Product Development Management in SMEs**
Bingwen Yan¹
¹Cape Peninsula University of Technology, South Africa

Technology & Knowledge Management (6)

9/12/2010 15:30 - 17:15
Room: NAPLES 2603

Chairs: Uchenna Cyril Eze
Hongyi Sun

Abstracts: see page 80

- **Fuzzy Axiomatic Design for Knowledge Demanders and Suppliers in Knowledge Service**
Xi Chen¹, Jing Han², Zhi-ping Fan³, Yang Liu³
¹Xi'dian University, China
²China Mobile Group, Shanxi Company, China
³Northeastern University, China
- **Information Technology Acceptance Models Comparison and IT Development Strategies: In Small and Medium Sized Enterprises Case**
Masoud Movahedi¹, Mostafa Zamanian², Amirhossein Meisami³
¹Imam Hussain University, Iran
²Amid Development Management Consultants, Iran
³K. N. Toosi University of Technology, Iran
- **A Framework for Measuring Performance Faculty Knowledge Management Program**
Amelia Kurniawati¹, Luciana Andrawina¹
¹Telecom Institute of Technology, Indonesia
- **An Evidential Reasoning Based LSA Approach to Document Classification for Knowledge Acquisition**
Rozlini Mohamed¹, Junzo Watada¹
¹Waseda University, Japan
- **Requirements Uncertainty and Standardization in IS Development Projects: A Survey of the IT Sector in China**
Younes Benslimane¹, Zijiang Yang¹, Bouchaib Bahlil²
¹York University, Canada
²Danube University, Austria
- **Knowledge Long Tail**
I-Ching Lin¹, Rainer Seidel¹, David Howell¹, David Walker¹
¹The University of Auckland, New Zealand
- **Knowledge Sharing and Total Quality Management: A Conceptual Framework**
Jamie Li-Yi Chua¹, Uchenna Eze¹, Gerald Guan Gan Goh¹
¹Multimedia University, Malaysia

Supply Chain Management (4)

9/12/2010 11:00 - 12:30
Room: NAPLES 2702

Chairs: Kamrul Ahsan
Mahdi Bashiri

Abstracts: see page 81

- **An EPQ Model Under Partial Trade Credit Financing with Credit Sensitive Demand**
Chandra K Jaggi¹
¹University of Delhi, India
- **A Novel Swarm Optimization Technique for Partner Selection in Virtual Enterprise**
Mohapatra S S¹, S. Sahu², Saurav Datta¹, Prasanna K¹, Nihar Ranjan Nayak¹
¹National Institute of Technology, India
²Indian Institute of Technology, Kharagpur, India
- **Understanding Trends of Car Recalls**
Kamrul Ahsan¹
¹Auckland University of Technology, New Zealand
- **Distribution Planning in Supply Chain Management**
Radha Ramanan Thiyagarajan¹, K Ratnakumar¹, Abhijith Vasudevan¹, Mishaal Sarawgi¹, Mithun Sundar Raj¹
¹National Institute of Technology Calicut, India
- **A Novel Rewards-based Protocol and Decision-making Technique for Transshipment in Supply Chains**
Lokendra Shastri¹, Srinivas Narasimhamurthy¹, Durga Prasad Muni¹
¹Infosys Technologies Limited, India
- **Reverse Logistics Network: A Review**
Zheng Wang¹, Hua Bai¹
¹Jinan University, China
- **Solving the Pickup and Delivery Problem in Semiconductor Supply Chain**
Chun-Mei Lai¹, Cheng-Che Chen¹
¹Far East University, Taiwan

Supply Chain Management (5)

9/12/2010 13:30 - 15:00
Room: NAPLES 2702

Chairs: Suk-Chul Rim
Assed Haddad

Abstracts: see page 82

- **Analysis of Value Chain Coordination via Revenue-Sharing for Improving the Expected Profits**
Yuhei Koike¹, Masato Kotani¹, Ushio Sumita¹, Yoshitugu Yamamoto¹
¹University of Tsukuba, Japan
- **Using Hybrid Metaheuristic Approaches to Solve Bi-Level Linear Programming Problem for Supply Chain Management**
R. J. Kuo¹, Y. S. Han²
¹National Taiwan University of Science and Technology, Taiwan
²National Taipei University of Technology, Taiwan
- **A Multi-Product Capacitated Inventory-Location Model with Risk Pooling**
Noura Al Dhaheer¹, Ali Diabat¹
¹MASDAR Institute, United Arab Emirates
- **Bees Algorithm for Dynamic Multi-Zone Dispatching in Truck Load Trucking**
Pairush Triwate¹, Pongchanun Luangpaiboon¹
¹Thammasat University, Thailand
- **Supply Chain Performance Improvement Using Vendor Management Inventory Strategy**
Wei Xu¹, Dongping Song¹, Michael Roe¹
¹University of Plymouth, United Kingdom
- **Stochastic P-hub Center Covering Problem with Delivery Time Constraint**
Mahdi Bashiri¹, Somayeh Mehrabi¹
¹Shahed University, Iran

Supply Chain Management (6)

9/12/2010 15:30 - 17:15
Room: NAPLES 2702

Chairs: Ushio Sumita
S.S. Mahapatra

Abstracts: see page 83

- **Impacts of Random Capacity and Fluctuating Environment On Inventory Systems**
Xiaoming Yan¹, Ping Cao², Minghui Zhang², Ke Liu²
¹Dongguan University of Technology, China
²Chinese Academy of Sciences, China
- **A Hierarchical Assessment Method using Bayesian Network for Material Risk Detection on Green Supply Chain**
Benjamin Yen¹, Bingcong Zeng¹
¹The University of Hong Kong, Hong Kong
- **Does Technology Capability-enriched Private Brand Impacts Customer Satisfaction and Loyalty in the Marketing Channel?**
Yin-Ying Wang¹, Yung-Hsin Chen², Shuo-Chang Tsai³, Long-Tai Chen⁴
¹National Yunlin University of Science and Technology, Taiwan
²National Cheng Kung University, Taiwan
³Asia University, Taiwan
⁴Industrial Technology Research Institute, Taiwan
- **Corporate Myopia, Forecast Precision, and Production Planning**
Zhaolin Li¹
¹The University of Sydney, Australia
- **Constitution and Evaluation of Waste Electric and Electronic Equipment Reverse Logistics Capability**
Jianchang Liu¹, Hua Zhong¹, Wenjing Wei¹
¹Beijing Institute of Technology, China
- **Optimal Single-Period Inventory Financing Decisions with Stochastic Demand**
Jiayan Xu¹, Ke Fu¹
¹Sun Yat-sen University, China

Production Planning & Control (2)

9/12/2010 11:00 - 12:30
Room: NAPLES 2602

Chairs: Carman Ka Man Lee
Junqiang Wang

Abstracts: see page 84

- **An Efficient Heuristic to Sequence Mixed-Model Assembly Lines**
Rico Gujjula¹, Hans-Otto Guenther¹
¹Technical University Berlin, Germany
- **Human-computer Collaborative Approach to Subassembly Planning of Complex Product**
Xiaoyi Wang¹, Huifen Wang²
¹Anhui University of Technology, China
²Nanjing University of Science and Technology, China
- **Multi-bottleneck Permutation Flow-shop Scheduling Driven by Bottleneck**
Junqiang Wang¹, Jianbin Yang¹, Jian Chen¹, Songfei Zhang¹, Shudong Sun¹
¹Northwestern Polytechnical University, Ministry of Education, China
- **Order-Lot Pegging Heuristics for Minimizing Total Tardiness in a Semiconductor Wafer Fabrication Facility**
Jae-Gon Kim¹, Seung-Kil Lim², SangOh Shim³, SeongWoo Choi⁴
¹University of Incheon, South Korea
²Sungkyul University, South Korea
³Hanbat National University, South Korea
⁴Kyonggi University, South Korea
- **An MILP Approach To Short-term Scheduling of an Industrial Make-and-Pack Production Facility with Batch Splitting and Quality Release Times**
Philipp Baumann¹, Norbert Trautmann¹
¹University of Bern, Switzerland
- **Solving Production Reconfiguration based on Constraint Satisfaction**
Linda Zhang¹, Qianli Xu²
¹University of Groningen, Netherlands
²Institute for Infocomm Research, A*STAR, Singapore

Production Planning & Control (3)

9/12/2010 13:30 - 15:00
Room: NAPLES 2602

Chairs: Seyyed Mohammad Taghi
Fatemi Ghomi
Seng Fatt Wong

Abstracts: see page 85

- **Hybrid Genetic Algorithm for Bi-objective Flow Shop Scheduling Problems with Re-entrant Jobs**
Carman Ka Man Lee¹, Danping Lin¹
¹Nanyang Technological University, Singapore
- **A Column Generation Heuristic for Dynamic Capacitated Lot Sizing with Random Demand Under a Fillrate Constraint**
Horst Tempelmeier¹
¹University of Cologne, Germany
- **A Decentralized VPLs based Control Policy for Semiconductor Manufacturing**
Shiqing Yao¹, Zhibin Jiang¹, Na Li¹, Ran Liu¹
¹Shanghai Jiao Tong University, China
- **Parallel Machines Scheduling with Dual Criteria and Sequence-dependent Setups: Cooperative Metaheuristics**
J. Behnamian¹, Seyyed Mohammad Taghi Fatemi Ghomi¹
¹Amirkabir University of Technology, Iran
- **A Hybrid Simulated Annealing for the Single Machine Capacitated Lot-sizing and Scheduling Problem with Sequence-dependent Setup Times and Costs**
M. Mirabi¹, Seyyed Mohammad Taghi Fatemi Ghomi²
¹Islamic Azad University, Iran
²Amirkabir University of Technology, Iran
- **A Fixed Rate Launching of Mixed-Model Car Sequencing in the Multiple Assembly Lines**
Suksan Prombanpong¹, Chaiya Dumkum¹, Ekarach Satranonda²
¹King Mongkut's University of Technology Thonburi, Thailand
²Mitsubishi Motors (Thailand), Thailand

Production Planning & Control (4)

9/12/2010 15:30 - 17:15
Room: NAPLES 2602

Chairs: Hsuan Pu Chang
Mohammad Mirabi

Abstracts: see page 86

- **Re-engineering the Forecasting Phase Using Traditional and Soft Computing Methods**
Massimo Bertolini¹, Maurizio Bevilacqua², Filippo Emanuele Ciarapica²
¹University of Parma, Italy
²Università Politecnica delle Marche, Italy
- **Incremental Temporal Reasoning in Job Shop Scheduling Repair**
Yi Huang¹, Li Zheng¹, Brian Williams², Lin Tang¹, Huasheng Yang¹
¹Tsinghua University, China
²Massachusetts Institute of Technology, United States
- **A GA-Based Heuristic Algorithm for Non-Permutation Two-Machine Robotic Flow-Shop Scheduling Problem of Minimizing Total Weighted Completion Time**
Juntao Li¹, Lizhen Zhang¹, Chunxia Shangguan¹, Hiroshi Kise²
¹Shanghai Ocean University, China
²Kyoto Institute of technology, Japan
- **Autonomous Product Manufacturing Cycle An Integrated Approach to Process Planning and Production Control**
Katja Windt¹, Oliver Jeken¹
¹Jacobs University Bremen, Germany
- **A Simulated Annealing-based Approach for Dynamic Facility Planning**
Tzer-Ming Chen¹, Ching Chih Chen¹, Shan-Ping Chuang²
¹National Taipei University of Technology, Taiwan
²Huafan University, Taiwan
- **A New Numerical Method of Nonlinear Equations by Four Order Runge-Kutta Method**
Ruitao Lin¹, Chan Wang¹, Fang Liu¹, Yueliang Xu¹
¹Southwest Jiaotong University, China

Service Innovation & Management (3)

9/12/2010 11:00 - 12:30
Room: NAPLES 2701

Chairs: Li Yueh Chen
Linda Zhang

Abstracts: see page 87

- **A Simulation on Impacts of a Dynamic Pricing Model for Perishable Foods on Retail Operations Productivity and Customer Behaviours**
Jaekwon Chung¹, Dong Li¹
¹University of Liverpool, United Kingdom
- **Identify Lead Users by Customer Competence**
Guozheng He¹, Jianan Yu²
¹Wuhan Textile University, China
²SAP Labs China, China
- **The Application of Lean Concept Combines Demand Channel and Supply Channel in Service Industry**
Yao-hung Hsieh¹, Hsiao-Ching Chen², Wei-Lung Chang²
¹China University of Technology, Taiwan
²Chungyu Institute of Technology, Taiwan
- **Applying Adaptive Course Caching and Presentation Strategies in M-learning Environment**
Hsuan Pu Chang¹
¹Tamkang University, Taiwan
- **The Impacts of Brand Trust, Customer Satisfaction, and Brand Loyalty on Word-of-Mouth**
Shu-Hsien Liao¹, Yu-Chun Chung¹, Yun-Ru Hung¹, Retno Widowati¹
¹Tamkang University, Taiwan
- **Evaluation on the Technological Innovation Capability in Companies Based on the Network**
Xiao-li Chen¹, Ralph Riedel¹, Egon Mueller¹
¹Chemnitz University of Technology, Germany

Operations Research (2)

9/12/2010 13:30 - 15:00
Room: NAPLES 2701

Chairs: Yong-Zai Lu
Kaveh Sheibani

Abstracts: see page 88

- **The Hierarchical Hub Maximal Covering Problem with Determinate Cover Radiuses**
Rashed Sahraeian¹, Ehsan Korani¹
¹Shahed University, Iran
- **Generating Large Scale Undirected Graph for Solving Flow Network Problems**
Shin-Guang Chen¹
¹Tungnan University, Taiwan
- **Process Management Systems and Public Healthcare in Brazil: Technology to Improve Service Delivery**
Daniel G. S. dos Santos¹
¹CEFET/RJ, Brazil
- **Genetic Algorithm Based Optimization of an Agent Based Queuing System**
Karthik Sankaranarayanan¹, Erik R Larsen¹, Ann Van Ackere², Carlos Arturo Delgado²
¹University of Lugano, Switzerland
²University of Lausanne, Switzerland
- **A Revenue Management Model in BTO Manufacturing Over an Infinite Horizon**
Li Li¹, Zhixiang Chen¹
¹Sun Yat-Sen University, China
- **Simulation Modeling and Analysis on Asset Planning for Emergency Medical System (EMS)**
Jieping Liu¹, Xiaocong Wang¹, Ming Cheng E¹
¹Beijing Jiaotong University, China

Operations Research (3)

9/12/2010 15:30 - 17:15
Room: NAPLES 2701

Chairs: Roel Leus
Zhaotong Lian

Abstracts: see page 89

- **Multiplicative Methods for Entropy Programming Problems and Their Applications**
Yuri Popkov¹
¹Institute for Systems Analysis, Russian Academy of Sciences, Russian Federation
- **An Effective Heuristic Considering Machine Flexibility for Parallel Machine with Eligibility Problem**
Rong-Hwa Huang¹, Tung Han Yu²
¹Fu Jen Catholic University, Taiwan
²Graduate Institute of Business Administration, Taiwan
- **The Fuzzy Greedy Search in Combinatorial Optimization with Specific Reference to the Travelling Salesman Problem**
Kaveh Sheibani¹
¹Iran Telecommunication Research Center, Iran
- **Computing Fixed Points of an Increasing Mapping from a Finite Lattice Formed by Integer Points of a Box into Itself**
Chuangyin Dang¹
¹City University of Hong Kong, Hong Kong
- **A Lagrangian Heuristic for a Dock Assignment Problem with Trailer Transportation**
Lotte Berghman¹, Roel Leus¹
¹Katholieke Universiteit Leuven, Belgium

Human Factors (3)

9/12/2010 11:00 - 12:30
Room: NAPLES 2601

Chairs: Sue Morton
Zhizhong Li

Abstracts: see page 90

- **Investigation of Ergonomics in Automotive Assembly Line Using Jack**
Jianwei Niu¹, Xiaowei Zhang¹, Xin Zhang², Linhua Ran²
¹University of Science and Technology Beijing, China
²China National Institute of Standardization, China
- **Leading a Technical Organization through Change: A Focus on the Key Drivers Affecting Communication**
Travesh Ramkhelawan¹, Marie-Louise Barry¹
¹University of Pretoria, South Africa
- **Human Errors Reliability Analysis in Coal Mine Accidents Based on Gray Relational Theory**
Jianyi Lan¹, Meiying Qiao¹
¹Henan Polytechnic University, China
- **A Study on Human Redundancy in Execution of Computerized Emergency Operating Procedures**
Xiaolu Dong¹, Zhizhong Li¹
¹Tsinghua University, China
- **A Study of Occupational Stress of Aviation Ground Crews**
Kuo-Shun Sun¹, Yu-Shan Lee¹
¹Kainan University, Taiwan
- **An Operational Framework in Forecasting Radical Innovation: The Case of the CO2-free Automobile**
Jean-Jacques Chanaron¹
¹Grenoble Ecole de Management, France

Quality Control & Management (2)

9/12/2010 13:30 - 15:00
Room: NAPLES 2601

Chairs: Philippe Castagliola
Fugee Tsung

Abstracts: see page 91

- **An Integrated T and TCUSUM Scheme**
Liang Qu¹
¹Nanyang Technological University, Singapore
- **A Single Chart for Monitoring Frequency and Magnitude of Events**
Zhang Wu¹, Qu Liang¹
¹Nanyang Technological University, Singapore
- **Preliminary Results Concerning the VSS Xbar Chart with Unknown In-Control Parameters**
Philippe Castagliola¹, Ying Zhang², Antonio Costa³, Petros Maravelakis⁴
¹IRCCyN UMR CNRS 6597 & Université de Nantes, France
²IRCCyN UMR CNRS 6597 & Ecole Centrale de Nantes, France
³Salo Paulo State University, Brazil
⁴University of the Aegean, Greece
- **Linear Profile Monitoring Using an Adaptive EWMA Control Chart**
Giovanna Capizzi¹, Guido Masarotto¹
¹University of Padua, Italy
- **Monitoring a Process with Mixed-Type and High-Dimensional Data**
Xianghui Ning¹, Fugee Tsung¹
¹Hong Kong University of Science and Technology, Hong Kong
- **EWMA Control Chart that Minimizes the Numbers of Defectives for Out-of-Control Cases**
Mohammad Shamsuzzaman¹, Zhang Wu²
¹University of Sharjah, United Arab Emirates
²Nanyang Technological University, Singapore

Quality Control & Management (3)

9/12/2010 15:30 - 17:15
Room: NAPLES 2601

Chairs: Kaibo Wang
Yaoguang Hu

Abstracts: see page 92

- **Soft Sensor Modeling for Feed Liquid Viscosity Control for PVC Gloves Based on BP Neural Network**
Yaoguang Hu¹, Cheng Xi¹, Xiangmin Cui¹, Ruijun Zhang², Yan Yan¹
¹Beijing Institute of Technology, China
²Renmin University, China
- **A Spatial Multivariate Process Capability Index**
Shaoli Wang¹, Arthur Yeh²
¹Northwestern Polytechnical University, China
²Bowling Green State University, United States
- **Statistical Process Adjustment of Multivariate Processes with Minimum Control Efforts**
Li Wang¹, Kaibo Wang²
¹University of South California, United States
²Tsinghua University, China
- **Competitive Analysis in Digital Electronics Industry of Pakistan**
Kinza Nasrullah¹, Hira Ali Jamal¹, Muhammad Asim²
¹National University of Sciences and Technology, Pakistan
²Center for Advance Studies in Engineering, Pakistan
- **Using Forecasting Technique in Quality Function Deployment to Facilitate Dynamic Customer Needs**
Liang-Tsung Lin¹, Ching-Pou Chang¹, Kuen-Ho Chiang¹
¹Hsiuping Institute of Technology, Taiwan
- **Quality Computation Model of Complex Assembling Process Using Multivariate Process Capability Index**
Yihai He¹, Wenbing Chang¹, Wei Ping Mu¹
¹Beijing University of Aeronautics and Astronautics, China
- **SWOT Analysis of Mobile Telecommunications Sector of Pakistan**
Muhammad Bilal Khan¹, Muhammad Asim²
¹National University of Sciences and Technology, Pakistan
²Center for Advance Studies in Engineering, Pakistan

Safety, Security & Risk Management (1)

9/12/2010 11:00 - 12:30
Room: SICILY 2502

Chairs: Sou-Sen Leu
Takashi Hasuike

Abstracts: see page 93

- **The Role of Safety Leadership in Improving Organization**
Minna Paivinen¹
¹*Safety Technology Authority, Finland*
- **Public Debt of Medical Security System: Is China Following in America's Footsteps?**
Shibin Song¹, Lizhi Feng¹, Xiaojun Xue¹, Mingmei Huang¹
¹*Sun Yat-sen University, China*
- **Oil Sensitivity and Systematic Risk in China O&G Industry Stock Indices**
Chunhong Li¹, Zhongying Qi¹, Zhibo Zhang², Jie Tang¹
¹*Harbin Institute of Technology, China*
²*China Executive Leadership Academy Pudong, China*
- **Safety Analysis of the Single-walled Steel Suspension Box Cofferdam During Construction**
Zanyun Xu¹, Wei Xu¹
¹*Tongji University, China*
- **Synergic Mode of Grid-based Traffic Risk Control in China's Coastal Waters**
Jinpeng Zhang¹, Quangen Fang¹, Shenping Hu¹
¹*Shanghai Maritime University, China*
- **Relative Risk Assessment Methodology in Vessel Traffic at Sea**
Shenping Hu¹, Quangen Fang¹, Jinpeng Zhang¹, Yongtao Xi¹
¹*Shanghai Maritime University, China*

Safety, Security & Risk Management (2)

9/12/2010 13:30 - 15:00
Room: SICILY 2502

Chairs: Shibin Song
I-Tung Yang

Abstracts: see page 94

- **HFACS Model Based Data Mining of Human Factors-A Marine Study**
Yongtao Xi¹, Weijiong Chen¹, Quangen Fang¹, Shenping Hu¹
¹*Shanghai Maritime University, China*
- **Applied Real-time Bayesian Analysis in Forecasting Tunnel Geological Conditions**
Sou-Sen Leu¹, Tri Joko¹, Abraham Sutanto¹
¹*National Taiwan University of Science and Technology, Taiwan*
- **Design of the Late-model Key Exchange Algorithm Based on the Polymorphic Cipher**
Yifeng Yin¹, Yong Gan¹, Hongyan Liu², Yupu Hu³
¹*Zhengzhou University of Light Industry, China*
²*NO.202 Institute of China Ordnance Industry, China*
³*Xidian University, China*
- **Workplace Accidents in Finnish Manufacturing Maintenance**
Janne Haatainen¹
¹*Tampere University of Technology, Finland*
- **Orientation and Guidance of Temporary Agency Workers**
Toni Hyytinen¹
¹*Tampere University of Technology, Finland*
- **A Virtualization Approach for Distributed Resources Security in Network Manufacturing**
Lei Ren¹, Yabin Zhang¹, Yongliang Luo², Lin Zhang¹
¹*Beijing University of Aeronautics and Astronautics, China*
²*Beihang University, China*

Safety, Security & Risk Management (3)

9/12/2010 15:30 - 17:15
Room: SICILY 2502

Chairs: Victor Esteves
Yifeng Yin

Abstracts: see page 95

- **Safety Management Problems Encountered by Industrial Service Providers**
Sanna Nenonen¹
¹*Tampere University of Technology, Finland*
- **Necessary Insurance in the Service Business of the Manufacturing Industry**
Juha Vasara¹
¹*Tampere University of Technology, Finland*
- **The Exploration of Instrument of Users' Privacy Concerns of Social Network Service**
Shilei Zheng¹, Kun Shi¹, Zhu Zeng¹, Qiang Lu¹
¹*Shenzhen Graduate School, Harbin Institute of Technology, China*
- **A Reformed Lattice Gas Model and Its Application in the Simulation of Evacuation in Hospital Fire**
Weili Zhang¹, Zhengyu Yao¹
¹*Southeast University, China*
- **Carbon Capture and Geological Storage - Technologies, Risk Analysis and Prospects for Use in Brazil**
Claudia Morgado¹, Victor Esteves¹
¹*Federal University of Rio de Janeiro, Brazil*
- **A Time-dependent Flow Model for Hazmat Transportation Routing**
Hongmei Jia¹, Lin Zhang¹, Manzhen Duan¹, Gao Fu¹
¹*Hebei Polytechnic University, China*

Project Management (2)

9/12/2010 11:00 - 12:30
Room: SICILY 2402

Chairs: Christina Chin May May
Hossam Ismail

Abstracts: see page 96

- **An Iterative Backward/Forward Technique for the Scheduling of Resource-Constrained Projects within Microsoft Project**
Norbert Trautmann¹, Philipp Baumann¹
¹University of Bern, Switzerland
- **Selecting Subcontractors in Projects Using a Multicriteria Group Decision Model**
Luciana Alencar¹, Adiel Almeida¹
¹Federal University of Pernambuco, Brazil
- **A IDEF0-Based Methodology for Project Reliability Assessment**
Hossam Ismail¹, Mustafa Rashid¹, Ping Zhu¹, Jenny Poolton¹
¹University of Liverpool, United Kingdom
- **Understanding the Requirements for Project Management Maturity Models: Awareness of the ICT Industry in Malaysia**
Roslan Jamaluddin¹, Christina May May Chin¹, Chan Wai Lee¹
¹University of Nottingham, Malaysia
- **Project Data Warehouse Management with Multivariate Analysis**
Jui-Sheng Chou¹, Hsien-Cheng Tseng²
¹National Taiwan University of Science and Technology, Taiwan
²Nissan Taiwan, Taiwan
- **A Support Tool for Assessing the Impact of Design Changes During Built Environment Projects**
Helen Hindmarch¹, Andrew Gale¹, Robert Harrison²
¹University of Manchester, United Kingdom
²Arup, United Kingdom

Systems Modeling & Simulation (1)

9/12/2010 13:30 - 15:00
Room: SICILY 2402

Chairs: Szu Hui Ng
Young Chel Kwun

Abstracts: see page 97

- **Interpreting the Out of Control Signals of the Generalized Variance |S| Control Chart**
Gerardo Avendano¹, Francisco Aparisi², Jose Sanz²
¹EAN University, Colombia
²Polytechnic University of Valencia, Spain
- **Effect of Confidence Interval on Bottleneck Identification via Simulation**
Chompoonoot Kasemset¹, Voratas Kachitvichyanukul²
¹Chiang Mai University, Thailand
²Asian Institute of Technology, Thailand
- **Performance Evaluation of Adaptive Cellular Manufacturing System using Simulation**
Jibi Job¹, Madhusudanan Pillai²
¹Federal Institute of Science and Technology, India
²National Institute of Technology Calicut, India
- **Response-based Interactive Motion Generation**
Xuelin Huang¹, Xiao Song¹, Guanghong Gong¹, Dongming Chen¹, Jiajia Li¹
¹Beihang University, China
- **Application of Stochastic Approximation Methods for Stochastic Computer Models Calibration**
Jun Yuan¹, Szu Hui Ng¹, Kwok-Leung Tsui²
¹National University of Singapore, Singapore
²Georgia Institute of Technology, United States
- **Designing a Robust and Cost-Effective Screening Strategy for Diabetic Retinopathy Using Simulation Coupled with Design of Experiments**
Irene Vidyanti¹, Shinyi Wu¹, Carl Kesselman¹
¹University of Southern California, United States

Systems Modeling & Simulation (2)

9/12/2010 15:30 - 17:15
Room: SICILY 2402

Chairs: Gerardo Avendano
Chuang-Chun Chiou

Abstracts: see page 98

- **Existence of Extremal Solutions for Impulsive Delay Fuzzy Differential Equations in (E, N^n, d_L)**
Young Chel Kwun¹, Jeong Soon Kim¹, Ja Hong Koo¹, Jin Han Park²
¹Dong-A University, South Korea
²Pukyong National University, South Korea
- **Analysis of Check-in Procedure Using Simulation: a Case Study**
Maurizio Bevilacqua¹, Filippo Emanuele Ciarapica¹
¹Università Politecnica delle Marche, Italy
- **Aeroengine Modules Performance Deterioration Modeling and Assessment**
Rui Zhu¹, Dezhi Wu¹, Zhirong Liu¹, Xinye Wu¹, Yinbiao Guo¹
¹Xiamen University, China
- **Modified Max-Plus Linear Representation for Inserting Time Buffers**
Shotaro Yoshida¹, Hirotaka Takahashi², Hiroyuki Goto¹
¹Nagaoka University of Technology, Japan
²Yamanashi Eiwa College, Japan
- **Impact of Bilateral Contracts on the Price Volatility in the Electricity Market**
Guanli Wang¹, Hui-Chih Hung¹
¹National University of Singapore, Singapore
- **Switched Hybrid Speed Control of Elastic Systems with Backlash**
Muhammad Burhan Khan¹, Fahad Mumtaz Malik¹, Khalid Munawar¹
¹National University of Science and Technology, Pakistan
- **Link-16 Model Architecture for Multiple Nets Simulation in NS-2**
Zhao-Xiong He¹, Xing Liu¹, Xue-Min Liu¹, Jinglun Zhou¹
¹National University of Defense Technology, China

- p.99 **Study on Comprehensive Evaluation for Small and Medium Enterprises in Supply Chain Finance**
Ying Chen¹, Chen Hong²
¹Shanghai University, China
- p.99 **Manufacturing Strategies in the Auto Industry in Brazil and Spain**
Jose Salles¹, Milton Vieira Jr.¹, Rodrigo Vaz¹, Rosangela Vanalle¹
¹Nove de Julho University, Brazil
- p.99 **A Fuzzy Integrated Vendor-Buyer Inventory Policy of Deteriorating Items Under Credibility Measure**
Chien-Chung Lo¹
¹National United University, Taiwan
- p.99 **Simulation Study of SCM-Related Factors on Retailer's Performance Using Structural Equation Model**
Erkan Bayraktar¹, Chang-Ching Lin², Kazim Sari³
¹Bahcesehir University, Turkey
²Tamkang University, Taiwan
³Beykent University, Turkey
- p.99 **Implementing a Green Manufacturing System Based on a Novel Assessment Model**
Chang-Lin Yang¹, Rong-Hwa Huang¹, Min-Sun Wuang¹, Yu-Chun Chen¹
¹Fu Jen Catholic University, Taiwan
- p.99 **An EMQ Model with Time-Varying Demand Over the Product Life Cycle**
Kuei-Chen Chiu¹, Chun-Wu Yeh², Chih-Chiang Fang³
¹Hsing Kuo University of Management, Taiwan
²Kun Shan University, Taiwan
³Shu-Te University, Taiwan
- p.99 **Toward Managing Demand Variability by Neuro-fuzzy Approach**
Wen-Pai Wang¹, Chun-Chih Chiu¹
¹National Chin-Yi University of Technology, Taiwan
- p.99 **Reinforcement Learning Based Scheduling in Semiconductor Final Testing**
Zhicong Zhang¹
¹Dongguan University of Technology, China
- p.100 **A Hybrid Ant Colony Optimization Method for Scheduling Batch Processing Machine in the Semiconductor Manufacturing**
Chengtao Guo¹, Zhibin Jiang¹, Hongtao Hu¹
¹Shanghai Jiao Tong University, China
- p.100 **Agent-Based Scheduling with a Learning Effect Model**
C.Y. Lam¹, W.H. Ip¹, C.H. Wu¹, S.L. Chan¹
¹The Hong Kong Polytechnic University, Hong Kong
- p.100 **New High Performing Hybrid Particle Swarm Optimization for Permutation Flow Shop Scheduling Problem with Minimization of Makespan**
Yi Sun¹, Min Liu¹, Chaoyong Zhang², Liang Gao², Kunlei Lian¹
¹State Key Laboratory of Digital Manufacturing Equipment and Technology, China
²Huazhong University of Science & Technology, China
- p.100 **How Managerial Ties Influence Firm Performance in China: A Perspective of Sensemaking**
Xue-Feng Zhu¹, Yuan-Qiong He¹
¹Huazhong University of Science and Technology, China
- p.100 **GenCos Decision-Making Constrained by Operational and Financial Requirements**
Guillermo Gutierrez¹
¹Instituto Tecnológico de Morelia, Mexico
- p.100 **The Urban Bus Supplier Selection Aided by AHP and Additive Scoring Model**
Tomasz Blaszczyk¹, Tomasz Wachowicz¹
¹Karol Adamiecki University of Economics, Poland
- p.100 **The Applications of Maximal Covering Model in Typhoon Emergency Shelter Location Problem**
Anping Pan¹
¹Wenzhou University, China
- p.100 **Comparing Product Development Models to Identify Process Coverage and Current Gaps: A Literature Review**
Armin Sharafi¹, Thomas Wolfenstetter¹, Petra Wolf¹, Helmut Krcmar¹
¹Technische Universität München, Germany
- p.101 **Research on Integrated Modeling Method for Modular Fixture Based on OO Technology**
Jin Cai¹, Guolin Duan¹, Tao Yao¹, Hongjing Xu¹, Xuebin Chen²
¹Hebei University of Technology, China
²Hebei Polytechnic University, China
- p.101 **Simulation and Experimental Verification of Linear Interpolation Cutter Path Error Produced by NC Servo Characteristics of Machining Center**
Hua Qiu¹, Chao Lin²
¹Kyushu Sangyo University, Japan
²Chongqing University, China
- p.101 **A Comparative Study for Designing Cellular Manufacturing Systems with Assembly Aspects by a New Approach**
Jamal Aliabadi¹, M.Bahador Aryanezhad¹, Reza Tavakkoli-Moghaddam²
¹Iran University of Science and Technology, Iran
²University of Tehran, Iran
- p.101 **Prediction of State of User's Behavior Using Hidden Markov Model in Ubiquitous Home Network**
Wonjoon Kang¹, Dongkyoo Shine¹, Dongil Shin¹
¹Sejong University, South Korea
- p.101 **Study of the Terminal-Pair Reliability in Grid Networks**
Young C. Park¹
¹Baekseok University, South Korea
- p.101 **An ADT Comprehensive Evaluation Method Based on Bayesian**
Lizhi Wang¹, Tongmin Jiang¹, Xiaoyang Li², Jingrui zhang¹
¹Beijing University of Aeronautics and Astronautics, China
²Beihang University, China
- p.101 **A Heuristic Approach for Transportation Planning Optimization in Container Yard**
Minghua Zhu¹, Xiumin Fan¹, Qichang He²
¹Shanghai Jiao Tong University, China
²Shanghai Key Lab of Advanced Manufacturing Environment, China
- p.101 **Alleviating Shaft Torsional Vibrations Caused by Electric Arc Furnaces for a Low Capacity Turbine Generator by Using a Flywheel Coupler**
Whei Min Lin¹, Chia Chun Tsai¹, Chi Hsiang Lin², Ta Peng Tsao³
¹National Sun Yat-Sen University, Taiwan
²Kao-Yuan University, Taiwan
³National Taipei University of Technology, Taiwan
- p.102 **A New Methodology to Integrate Human Factors Analysis and Classification System with Bayesian Network**
Yanfu Wang¹, Shahrzad Faghiehrroo², Xiu Ming Hu², Min Xie²
¹National University of Singapore & China University of Petroleum, Singapore
²National University of Singapore, Singapore
- p.102 **Effects of Psychological Empowerment on the Performance of R&D Employees: Moderating Effects of LOC**
Yang Di¹, Yi Li²
¹Alcatel Lucent Technologies, China
²Shanghai Univesity, China
- p.102 **The Analysis and Design of Urban Bridge Safety Early-warning Management System**
Rong Liu¹
¹Chongqing Jiaotong University, China
- p.102 **Pavement Performance Evaluation Based on Entropy Weight Radar Chart Theory**
Hongyun Yao¹, Rongjun Xing¹, Pai Xu¹
¹Chongqing Jiaotong University, China

- p.102 **Development of an Explanatory Model of Cycles within Development Processes by Integrating Process and Context Perspective**
Stefan Langer¹, Arne Herberg¹, Klaus Körber¹, Udo Lindemann¹
¹Technische Universität München, Germany
- p.102 **Research on the Innovation BT Mode of Urban Rail Transit Projects Based on Project Control Right - A Case of Shenzhen Metro Line 5**
Ling Yan¹, Yufei Zhao¹, Yaling Du¹
¹Tianjin University of Technology, China
- p.102 **Ideation for the Problem of Component Placing**
Christine Chou¹, Steven Kimbrough², Thomas Lee²
¹National Dong Hua University, Taiwan
²University of Pennsylvania, United States
- p.102 **An Automatic Ontology Building Method with Case-base in Semantic SOA Integrated System**
Qicheng Zhang¹, Lin Zhang², Yongliang Luo¹, Baolu Wang¹
¹Beihang University, China
²Simulation Center, China
- p.103 **Embracing Open Innovation and Disruptive Innovation as Strategies for Chinese Companies**
Jun Jin¹, Shanchao Wu¹, Aijun Ruan², Xiaomei Wang³
¹Zhejiang University, China
²Taizhou University, China
³Zhejiang Forestry College, China
- p.103 **Niche Strategy, Interfirm Network and Technological Innovation of Latecomer Firms: A Case from China**
Lijuan Wu¹, Haiting Huang², Ju Li³, Xinmin Peng¹, Ruiqing Huang¹
¹Zhejiang Wanli University, China
²Zhejiang Textile & Fashion College, China
³Zhejiang University, China
- p.103 **University-Industry Cooperation and its Impact on the Innovation Performance of Firms in China: A Conceptual Model**
Shichao Li¹, Jun Su¹
¹Tsinghua University, China
- p.103 **Application of Digital Watermark Technology for Movie Data in Streaming Distribution Service**
Manabu Hirakawa¹, Junichi Ijima¹
¹Tokyo Institute of Technology, Japan
- p.103 **An Objective Measure of Risk**
Jiang Hong¹, Jian Zhai¹
¹Zhejiang University, China
- p.103 **Engaging Employees in Organizational Commitment: The Training Quality in Industrial Management**
Chien-Pei Ko¹, Chen-Chen Ko², Shiu-Chuan Chiu¹
¹Ching-Kuo Institute of Management and Health, Taiwan
²National Changhua University of Education, Taiwan
- p.103 **The Moderator Role of Organizational Structure and Network on International Entrepreneurship: A Study of Chinese Firms**
Hairu Yang¹
¹Shanghai Financial College, China
- p.104 **Cost of Quality Modeling: Extension and Improvement**
Mohamed K. Omar¹, Sharweeni Murugan¹, Nor Akramin Bin Mohamad¹, Mohamad Razali¹
¹University Technical Melaka, Malaysia
- p.104 **Internal Customer Orientation and Internal Supply Chain Management**
Qionglei Yu¹, Yi Qiu¹, Wei Feng¹
¹Zhejiang Gongshang University, China
- p.104 **Customer-Supplier Relationship: a Multicases Study in the Brazilian Automotive Industry**
Rosangela Vanalle¹, Alexandre Dias¹, Jose Salles¹
¹Nove de Julho University, Brazil

Decision Analysis & Methods (7)

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Mohammed-Aminu Sanda

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- **Oligarchic's Game Equilibrium Model in Regional Power Markets with Financial Options**
Fang Wang¹
¹Hunan Agricultural University, China
- **Assignment Problem Formulation Under Competence and Preference Constraints**
Raoudha Mkaouer Hachicha¹, El Mouloudi Dafaoui¹, Abderrahman El Mhamedi¹
¹University of Paris 8, France
- **Selection of Construction Method for Large Section Soil Tunnel and Analysis of Monitoring Results During Construction Period**
Ya Li Xu¹, Zeng Rong Liu¹, Quan Zhang²
¹Xi'an University of Architecture and Technology, China
²Longyan Institute of Architectural Design and Research, China
- **Classifying and Ranking DMUs of Different Efficiency Levels**
Gongbing Bi¹, Linlin Zhang¹
¹University of Science and Technology of China, China
- **Modeling and Simulation of Operational Decisions in Manufacturing Enterprises Based on SD and BSC**
Ying Yang¹
¹Donghua University, China

Technology & Knowledge Management (7)

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Chairs: Prattana Punnakitkashem
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- **Technological Upgrading Path for Latecomer Firms in Global Value Chain: The Case of YOUNGOR from China**
Xinmin Peng¹, Na Li¹, Changjuan Zheng¹, Lijuan Wu¹, Ruiqing Huang¹
¹Zhejiang Wanli University, China
- **The Role of Outbound-Revealing Open Innovation: Theoretical Extension and Case Study**
Pengfei Wang¹, Yisha Zhou¹
¹Zhejiang University, China
- **Visual Knowledge Service Market for Employment Information Grid**
Chunlai Chai¹
¹Zhejiang GongShang University, China
- **The Representation and Analysis Methods of Domain Knowledge of Scientific Research Organization Based on Knowledge Network**
Ruishen Chen¹, Haifeng Zhao¹, Guanwei Huang¹
¹Tongji University, China
- **Science and Technology Map Analysis of a Multi-Disciplinary Field Case Study of Aerospace Engineering**
Hiroko Nakamura¹, Hajime Sasaki¹, Naoki Shibata¹, Yuya Kajikawa¹, Ichiro Sakata¹, Shinji Suzuki¹
¹The University of Tokyo, Japan
- **The Role of Organizational Factors in the International Technology Transfer Project Success: An Empirical Investigation**
Mohammadreza Taghva¹, Seyed Habibollah Tabatabaeian¹, Kamal Mohammadi¹
¹Allameh Tabatabaei University, Iran

Intelligent Systems (1)

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Chairs: Suthep Butdee
R. J. Kuo

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- **Decision Making of Facility Locations Based on Fuzzy Probability Distribution Function**
Pei-Chun Lin¹, Shuming Wang¹, Junzo Watada¹
¹Waseda University, Japan
- **Predicting Customer-supplier Relationships Using Network-based Features**
Junichiro Mori¹, Yuya Kajikawa¹, Ichiro Sakata¹, Hisashi Kashima¹
¹The University of Tokyo, Japan
- **Using Constraints Filtering and Evolutionary Algorithms for Interactive Configuration and Planning**
Paul Pitiot¹, Michel Aldanondo¹, Meriem Djefel², Elise Vareilles¹, Paul Gaborit¹, Thierry Coudert³
¹Toulouse University - Mines Albi, France
²Toulouse University - Mines Albi, INSA, France
³Toulouse University - ENIT / LGP, France
- **Decision Tree Based Demand Forecasts for Improving Inventory Performance**
Pradip Kumar Bala¹
¹Xavier Institute of Management, Bhubaneswar, India
- **SVR Sagittal Balance of a Biped Robot Controlling the Torso and Ankle Joint Angles**
J. P. Ferreira¹, Manuel Crisóstomo², António Coimbra²
¹Superior Institute of Engineering of Coimbra, Portugal
²University of Coimbra, Portugal
- **Fault Detection Methods for Reconfigurable Manipulators Via Decentralized Adaptive Fuzzy Nonlinear Observer**
Peng Lu¹, Bo Zhao¹, Yuanchun Li¹
¹Jilin University, China

Intelligent Systems (2)

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Chairs: Manuel Crisóstomo
Ichiro Sakata

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- **Composite Orthonormal Basis for Person-Independent Facial Expression Recognition**
Wenfei Gu¹, Y.V. Venkatesh¹, Cheng Xiang¹
¹National University of Singapore, Singapore
- **An Intelligent Approach of Obtaining Feasible Machining Methods and Their Selection Priorities Based on Features Using Neural Network**
Guang Ru Hua¹, Qing Hui Dai¹
¹North China Electric Power University, China
- **Mixed Signature Descriptor with Global Invariants for 3D Motion Trajectory Perception and Recognition**
Jianyu Yang¹, Y. F. Li², Keyi Wang¹
¹USTC/Cityu Joint Center, China
²City University of Hong Kong, Hong Kong
- **Body Sensor Network Based Prosthesis Training System for Leg-Amputees**
Chenn-Jung Huang¹, Chin-Fa Lin¹, Po-Yen Tsai¹, Yu-Wu Wang¹, Ching-Yu Li¹, Heng-Ming Chen¹, Jia-Jian Liao²
¹National Dong Hua University, Taiwan
²National Taiwan University, Taiwan
- **Algorithm of an Optimization Route for Collaborative 2 Swarm Robots**
Suthep Butdee¹, Kritsak Tangchaidee¹
¹King Mongkut's University of Technology North Bangkok, Thailand

Engineering Economy & Cost Analysis (1)

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Chairs: Poul Kyvsgaard Hansen
Songlin Chen

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- **Towards Customer Evaluation Based Product Performance Modeling**
Chathura Withanage¹, Hae-Jin Choi², Truong Ton Hien Duc³, Taezoon Park¹
¹Nanyang Technological University, Singapore
²Chung Ang University, South Korea
³Singapore Institute of Manufacturing and Technology, Singapore
- **Synthesizing Judgment Matrix and Risk-odds Matrix for Small-sample Combined Forecasting**
Li Xie¹, Ru-Xiang Wei¹, Da-Wei Zhang¹
¹Naval University of Engineering, China
- **Evaluation of TOU Price Based on Responses of Customer**
Yu Cheng¹, Nana Zhai¹
¹North China Electric Power University, China
- **Analogy in Contemporary Engineering Economy: Mortgage Loan and Bond Pricing**
Kai Lam¹
¹The Chinese University of Hong Kong, China
- **A New Approach to Improve Functionality for Cost Reduction in Construction Project**
Shujing Li¹
¹Tianjin Institute of Urban Construction, China

Engineering Economy & Cost Analysis (2)

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Chairs: Kai Lam
Jean-Jacques Chanaron

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- **Life Cycle Costing Analysis for Poly-Silicon Photovoltaics Production Processes in Japan**
Toshihiro Inoue¹, Yuya Kajikawa¹, Koichi Yamada¹
¹The University of Tokyo, Japan
- **An Extended Pricing Model for Wireless Oligopolies**
Hailing Zhu¹, Andre L Nel¹, Wimpie Clarke¹
¹University of Johannesburg, South Africa
- **Particle Swarm Optimization Algorithm for Optimization of Utility Systems in Chemical Processes**
Wenzhi Dai¹, Lin Mu², Hongchao Yin², Wei-Haur Lam²
¹Dalian University of Technology, Dalian university of Technology, China
²Dalian University of Technology, China
- **Thermoeconomics Cost Modeling of Marine Gas Turbine Generating Unit**
Youhong Yu¹, F.R Sun¹
¹Naval University of Engineering, China
- **New Service Development Success Factors: A Managerial Perspective**
Dayu Jin¹, Kah-Hin Chai¹, Kay Chuan Tan¹
¹National University of Singapore, Singapore

Production Planning & Control (5)

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Room: NAPLES 2602

Chairs: Jack Su
Radha Ramanan Thiyagarajan

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- **The Impact of Product Proliferation in Reverse Supply Chain**
Vincent Huang¹, Jack Su¹
¹National Tsing Hua University, Taiwan
- **Performance Evaluation of a Mixed-model Assembly Line with a Bypass Subline Under Line Stop Condition**
Mitsutoshi Kojima¹, Kenichi Nakashima²
¹Nagoya Institute of Technology, Japan
²Kanagawa University, Japan
- **Development of a Hybrid Model for Manufacturing Cell Formation Using Linguistic Theory**
Nirjhar Roy¹
¹M.N. National Institute of Technology, India
- **Novel Approach for Balancing Manual Automobile Assembly Based on Genetic Algorithm**
Qiu Hua Tang¹, Zhonghua Xiao¹, Yanli Liang¹, Mingxing Deng¹, Zhongmin Xi²
¹Wuhan University of Science and Technology, China
²Technique Center of Dongfeng Peugeot Citroen Automobile Company, China
- **Multi-objective Particle Swarm Optimization with Negative Knowledge for U-shaped Assembly Line Worker Allocation Problems**
Ronnachai Sirovetnukul¹, Parames Chutima²
¹Mahidol University, Thailand
²Chulalongkorn University, Thailand
- **Risk Analysis and Response for Flow Construction**
Zhiyong Yang¹, Zhuofu Wang¹, Bingsheng Liu¹, Zurong Chen¹
¹Hohai University, China

Systems Modeling & Simulation (3)

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Chairs: Young Chel Kwun
Dong Li

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- **A Novel Compatible Runtime Infrastructure under Complex Environment**
Yingchao Yue¹, Tiaoyuan Xiao¹, Wenhui Fan¹, Shucai Tang¹, Xin Chen¹
¹Tsinghua University, China
- **A Reflective Memory Network Based Runtime Infrastructure**
Xin Chen¹, Wenhui Fan¹, Yingchao Yue¹
¹Tsinghua University, China
- **A Performance Comparison between the Extended Kanban Control System (EKCS) and the Traditional Kanban Control System (TKCS)**
Alvin Ang¹, Rajesh Piplani¹
¹Nanyang Technological University, Singapore
- **Production Simulation using a Distributed Node-Aware System**
Haw-Ching Yang¹, Z.-B. Wang¹, J.-S. Peng¹
¹National Kaohsiung First University of Science and Technology, Taiwan
- **CAD/CAM System for Formed Turning Tool Grinding**
Wei He¹, Y. Q. Tan², Min Ren¹
¹University of Electronic Science and Technology of China, China
²University of Jilin, China
- **A Decomposition Based Algorithm for the Scheduling Problem in Wafer Fabrication System**
Hongtao Hu¹, Zhibin Jiang¹, Chengtao Guo¹, Ran Liu¹
¹Shanghai Jiao Tong University, China

Service Innovation & Management (4)

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Chairs: Bingwen Yan
Hongyi Sun

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- **The Mediating Role of Incubator Capability for the Relationship between Incubator Resources and Incubator Performance**
Yanjie Li¹, Dechang Lin¹, Hongwei Wang², Qiang Lu¹, Hong Yin¹
¹Shenzhen Graduate School, Harbin Institute of Technology, China
²Nanshan Technology Venture Service Center, China
- **Enhanced User Experience Design Based on User Behavior Data by Using Theory of Inventive Problem Solving**
Song-Kyoo Kim¹
¹Samsung Electronics Co., Ltd, South Korea
- **Towards a Knowledge-based Taxonomy for Value Creation Patterns in Professional Service Firms: Cases of Law Firms in People's Republic of China**
Jiang Wei¹, Jiangqi Zhao¹, Yang Liu¹
¹Zhejiang University, China
- **State Space Model Based Dimensional Errors Analysis for Rigid Part in Multistation Manufacturing Processes**
Ying-xue Tong¹, Yan Wu¹, Bin-kuan Ma², Faping Zhang³, Jiping Lu³
¹Sha Shi University, China
²Information Center of Xi'an Dong Fang Group Co., Ltd, China
³Beijing Institute of Technology, China
- **Measuring After-sales Service Quality in Automobile Retail: an Application of the SERVQUAL Instruments**
Bingwen Yan¹, Patrick McLaren¹
¹Cape Peninsula University of Technology, South Africa
- **Quality Function Deployment of Cement Industry in Pakistan**
Khazal Dar¹, Muhammad Usama Shairi¹, Muhammad Asim²
¹National University of Sciences and Technology, Pakistan
²Center for Advance Studies in Engineering, Pakistan

Operations Research (4)

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Chairs: Rashed Sahraeian
Xiaoming Liu

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- **A Multi-Period Return-Risk Measure Portfolio Optimization Problem Incorporating Risk Strategies**
Hossein Parsa¹, Mingzhou Jin², Xuechun Liang³
¹Mississippi State Uni, United States
²Mississippi State University, United States
³Nanjing University of Technology, China
- **A Nested Genetic Optimization Algorithm for the Capacitated Facility Location Problem**
Shan Huen Huang¹, Pei Chun Lin², Hou Ip Chan²
¹National Kaohsiung First University of Science and Technology, Taiwan
²National Cheng Kung University, Taiwan
- **A Weighting Scheme and a Model for Computing Alternative Pareto Optimal Solutions of Multi Objective Linear Programming Problems**
Yashar Maali¹, Nezam Mahdavi-Amiri²
¹University of Technology, Sydney, Australia
²Sharif University of Technology, Iran
- **Evaluation of the Solution for an Optimal Shelf Allocation for SPA Retailers**
Takuya Suganuma¹, Hiroyuki Goto¹
¹Nagaoka University of Technology, Japan
- **NonLinear Quintic Schrodinger Equations with Complex Initial Conditions, Limited Time Response**
Magdy El Tawil¹, Hanafy El Zoheiry¹, Sherif E. Nasr²
¹Cairo University, Egypt
²Fayoum University, Egypt
- **Scheduling and Planning the Outbound Baggage Process at International Airports**
Markus Frey¹, Christian Artigues², Rainer Kolisch¹, Pierre Lopez²
¹Technische Universität München, Germany
²Université de Toulouse, France

Quality Control & Management (4)

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Chairs: Caiwen Zhang
Shaoyi Wang

Abstracts: see page 115

- **Quality Control via Simplex Search-Based Model Free Optimization for Injection Molding**
Xiangsong Kong¹, Zhijiang Shao¹, Xi Chen¹
¹Zhejiang University, China
- **Generic Compliance Check Tool in Examining the Conformity of Company-Specific Standards to Public Standards**
Karen Tso-Sutter¹, Lars Karg¹
¹SAP Research, Germany
- **Applying Fast Fourier Transform (FFT) to Statistic Quality Control**
Youxiang Cui¹, Jianxin You¹, Feng Luo¹
¹Tongji University, China
- **SWOT Analysis and the Key Driving Factors as an Indicator of the Current Situation of CNG Industry of Pakistan**
Sahar Tanveer¹, Muhammad Asim²
¹National University of Sciences and Technology, Pakistan
²Center for Advance Studies in Engineering, Pakistan
- **An Evaluation of the Relationship Between Emotional Labor and Volunteers' Positive Affective Delivery: In Non-Profit Organizations in Taiwan**
Chen-Yang Shih¹, PeiWen Liao¹, Chung-Hsiung Fang¹
¹National Taiwan Normal University, Taiwan
- **Multistage Process Monitoring Using Survival Analysis Regression Models**
Shervin Asadzadeh¹, Abdollah Aghaie¹, Yaser Samimi¹
¹K.N. Toosi University of Technology, Iran

Eco-system and New Business Model

10/12/2010 11:00 - 12:30
Room: NAPLES 2601

Chairs: Qiang Lu
Yongjiang Shi

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- **Illustrating the Concept of Business Ecosystem from Views of Bionics and Competitive Network and Related Theories**
Jie Hou¹, Qiang Lu¹, Yongjiang Shi², Ke Rong²
¹Shenzhen Graduate School, Harbin Institute of Technology, China
²University of Cambridge, United Kingdom
- **Critical Factors for Technology Roadmapping: Case Studies**
Jie Hou¹, Qiang Lu¹, Yongjiang Shi², Ke Rong², Qun Lei³
¹Shenzhen Graduate School, Harbin Institute of Technology, China
²University of Cambridge, United Kingdom
³Han's Laser Company, China
- **From Value Chain, Supply Network, Towards Business Ecosystem (BE): Evaluating the BE Concept's Implications to Emerging Industrial Demand**
Ke Rong¹, Jie Hou², Yongjiang Shi¹, Qiang Lu²
¹University of Cambridge, United Kingdom
²Shenzhen Graduate School, Harbin Institute of Technology, China
- **Renew Business Ecosystem: A Comparison Study between Traditional and Shanzhai network**
Ke Rong¹, Yongjiang Shi¹
¹University of Cambridge, United Kingdom
- **Shanzhai (山寨) Manufacturing and its Network Behaviors**
Yongjiang Shi¹, Ke Rong¹
¹University of Cambridge, United Kingdom
- **A New Operations Model of Logistics Service Providers: Evidence from EA Company**
Xiaoling Zhang¹, Qiang Lu¹, Cai Wen Zhang²
¹Shenzhen Graduate School, Harbin Institute of Technology, China
²Sun Yat-sen University, China

Reliability & Maintenance Engineering (2)

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Room: SICILY 2502

Chairs: Zhixin Yang
Young C. Park

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- **Recent Trends in Systems Performance Monitoring & Failure Diagnosis**
K P Ramachandran¹, Khalid Fathi¹, B K Nagaraja Rao²
¹Caledonian College of Engineering, Oman
²COMADEM International, United Kingdom
- **Energy Consumption Modeling for Machine Tools After Preventive Maintenance**
Jihong Yan¹, Dingguo Hua¹
¹Harbin Institute of Technology, China
- **Reliability Optimization Model of Standby Phased-mission Systems Based on BDD**
Tao Hu¹, Jian Yu¹, Jian-Jun Yang¹, Ming-en Sheng²
¹Naval University of Engineering, China
²Naval 702 Factory, China
- **Boundary-approaching Particle Swarm Optimization in Reliability-based Design Optimization**
I-Tung Yang¹, Yi-Hung Hsieh¹
¹National Taiwan University of Science and Technology, Taiwan
- **An Imperfect Process Strategy for a Repairable Product with Production Correction and Maintenance**
Gwo-Liang Liao¹, Yar-Tin Chang², Bor-Ling Shaw³, Hung Yu Huang¹
¹National Taitung University, Taiwan
²Tian-Mu Junior High School, Taiwan
³China University of Science & Technology, Taiwan
- **A General Framework to Make A Sequential Preventive Maintenances Decision Using Proportional Hazards Model (PHM)**
Ping Jiang¹, Ming Zuo², Jae-Hak Lim³, Bo Guo¹
¹National University of Defense Technology, China
²University of Alberta, Canada
³Hanbat National University, South Korea

Reliability & Maintenance Engineering (3)

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Chairs: Ramachandran K P
Mohammad AlDurgam

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- **Reliability Model of Multiplatform Phased Mission System Based on CPN**
Chun-Hui Yang¹, Jian-Jun Yang¹, Peng Dong¹, Ming Li²
¹Naval University of Engineering, China
²China Shipbuilding Industry Corporation, China
- **Machine Condition Monitoring and Fault Diagnosis based on Support Vector Machine**
Jianhua Zhong¹, Zhixin Yang¹, Seng Fat Wong¹
¹University of Macau, Macau
- **Improving Healthcare Reliability by Integrating Six-sigma in a Business Process Modeling and Analysis Strategy**
Zied Ben Atallah¹, Amar Ramudhin¹
¹École de Technologie Supérieure, Canada
- **Optimal Maintenance Policy for Three-States POMDP with Quality Measurement Errors**
Mohammad AlDurgam¹, Salih O. Duffuaa¹
¹King Fahd University of Petroleum and Minerals, Saudi Arabia
- **Application of Accelerated Failure Model for Oil and Gas Industry in Arctic Region**
Abbas Barabadi¹, Javad Barabady¹, Tore Markeset²
¹University of Tromsø, Norway
²University of Stavanger, Norway
- **Assurance Technologies for Electric Point Machine Controlled by Optical LAN**
Yoshiyuki Hirano¹, Gen Kogure¹, Shinichi Ryoki¹, Tadao Miura¹, Takashi Kunifuji¹, Yuichiro Den¹
¹East Japan Railway Company, Japan

Global Manufacturing & Management (1)

10/12/2010 09:00 - 10:30
Room: SICILY 2402

Chairs: Yong-Zai Lu
Sue Morton

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- **Implementation Framework for Collaboration in a Non-Hierarchical Business Network**
Ahm Shamsuzzoha¹, Timo Kankaanpää¹, Luis Carneiro², Petri Helo¹
¹University of Vaasa, Finland
²INESC-Porto, Portugal
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¹Beihang University, China

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Abstracts

Session	Decision Analysis & Methods (1)
Date	8/12/2010
Time	11:00 - 12:30
Room	NAPLES 2703
Chairs	Krzysztof Ostaszewski; Mubarak Almutairi

Pricing Insurance Contracts and Determining Optimal Capital of Insurers

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¹Shanghai Second Polytechnic University, China

²Illinois State University, United States

In this paper, we extend Kliger and Levikson's approach for pricing insurance contracts by considering the influence of level of capital held on the price of insurance contracts, and we discuss determination of optimal capital level for an insurer. The results of our analysis show that the optimal number of insured, the maximum value of expected profit increase, optimal premium (price), and the optimal probability of insolvency decrease under the condition of optimal capital level. We also extend the above approach to multiline cases and determine optimal numbers of policies, prices and capital allocation strategy for multi-line insurance contracts.

Two-Decision-Maker Cooperative Games with Fuzzy Preferences

Mubarak Almutairi¹

¹Hafr Albatin Community College, Saudi Arabia

In game theory, two or more parties need to make decisions with fully or partially conflicting objectives. In situations where reaching a more favourable outcome depends upon cooperation between the two conflicting parties, some of the mental and subjective attitudes of the decision makers must be considered. While the decision to cooperate with others bears some risks due to uncertainty and loss of control, not cooperating means giving up potential benefits. In practice, decisions must be made under risk, uncertainty, and incomplete or fuzzy information. Because it is able to work well with vague, ambiguous, imprecise, noisy or missing information, the fuzzy approach is effective for modeling such multicriteria conflicting situations. The well-known game of Prisoner's Dilemma, which reflects a basic situation in which one must decide whether to cooperate or not with a competitor, is systematically solved using a fuzzy approach. The fuzzy procedure is used to incorporate some of the subjective attitudes of the decision makers that are difficult to model using classical game theory. Furthermore, it permits researchers to consider the subjective attitudes of the decision makers and make better decisions in subjective, uncertain, and risky situations.

An Integrated Fuzzy Multi-criteria Decision Making Approach for Realizing the Practice of Quality Function Deployment

Chih-Hsuan Wang¹

¹National Chiao Tung University, Taiwan

In order to avoid fierce price competition, companies intend to differentiate their product lines and to target specific niche market segments. However, companies with expending product lines/families often face the challenge of controlling inventory cost, consistent product quality and good delivery performance. As a result, the platform based modular design becomes a promising method to overcome the above-mentioned difficulties. In this paper, a QFD (quality function deployment) based scheme is presented to accomplish the following tasks, including prioritizing customer need for distinct market segments, linking marketing customer need with technical design requirement, and seeking an optimal modular design. In particular, this study integrates the fuzzy AHP (Analytical Hierarchy Process) and the fuzzy DEMATEL (DEcision MAKing Trial and Evaluation Laboratory) to achieve the goal of marketing-driven product development. An illustrating example relevant to designing a smart phone is used to validate the proposed approach.

An Empirical Analysis of Elicited Weights in AHP

Céline Verly¹, Karim Lidouh¹, Yves De Smet¹

¹Université Libre de Bruxelles, Belgium

The Analytic Hierarchy Process (AHP) requires the decision maker to provide pairwise comparisons to obtain a complete ranking of the alternatives. One of the main concerns of this method is related to the level of consistency needed to produce reliable results. When the decision maker is not consistent enough, resulting scores and weights values are questionable. The aim of this paper is to study the robustness of AHP regarding the use of the eigenvector method (to derive weights and scores) and the consequences of imposing a 9 level ratio-scale. These two points were considered when tackling the problem of weights elicitation for the criteria. To that aim, we use a simulation approach.

Overall Weighting Equipment Effectiveness

Ratapol Wudhikarn¹

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This research is designed to improve the original Overall Equipment Effectiveness (OEE). The OEE is the process, in which acquired to specify an equivalent weight setting of every single element, even though; each concerning losses are totally different. Hence, the study proposes a simpler weight setting method, so called the Rank-Order Centroid (ROC), to identify dissimilarity in weighting each OEE element. The ROC methodology is easier to determine the weight than the existing weighted OEE method, which is based on an analytical hierarchy process. This newly calculating methodology is the Overall Weighting Equipment Effectiveness (OWEE). It is presented and also implemented in a fiber cement roof manufacturer. The result granted from OWEE, however, is different from those of the original OEE and of the existing weighted OEE.

Diversity of Feature Selection Approaches Combined with Distinct Classifiers

Feng-Chia Li¹, Peng-Kai Wang², Cho Hua Yeh³

¹Jen Teh Junior College, Taiwan

²Hwa Hsia College, Taiwan

³Tsing Hua University, Taiwan

The credit scoring has been regarded as a critical topic and its related departments make efforts to collect huge amount of data to avoid wrong decision. An effective classificatory model will objectively help managers instead of intuitive experience. This study proposes five approaches combining with the back-propagation neural network (BPN) classifier for features selection that retains sufficient information for classification purpose. Different credit scoring models are constructed by selecting attributes with five approaches. Two UCI (University of California, Irvine) data sets are chosen to evaluate the accuracy of various hybrid-BPN models. BPN classifier combines with conventional statistical LDA, Decision tree, Rough sets theory, F-score and Gray relation approaches as features preprocessing step to optimize feature space by removing both irrelevant and redundant features. In this paper, the procedure of the proposed approaches will be described and then evaluated by their performances. The results are compared in combination with BPN classifier and nonparametric Wilcoxon signed rank test will be held to show if there is any significant difference between these models. The result in this study suggests that hybrid credit scoring approach is mostly robust and effective in finding optimal subsets and is a promising method to the fields of data mining.

Session	Decision Analysis & Methods (2)
Date	8/12/2010
Time	13:30 - 15:00
Room	NAPLES 2703
Chairs	Prasanta Deb, Mei-Chen Lo

A Dynamic Differential Evolution Algorithm for Mixed Logit Discrete Choice Model Estimation

Songlin Chen¹, Youbang Zhang¹, Xiaojin Zhang¹, Jianxin Jiao²

¹Nanyang Technological University, Singapore

²Georgia Institute of Technology, United States

The mixed logit (ML) discrete choice model is highly flexible and capable of modeling complex choice behaviors. A popular method for estimation of an ML model is through maximization of a simulated likelihood function, which, however, often contains multiple local optima in a high-dimensional solution space. This paper reports the development of a dynamic differential evolution (DE) algorithm for the estimation of a general ML model with correlated tastes and repeated choices. Compared with the gradient based algorithms that are commonly adopted in literature, the proposed DE algorithm is less sensitive to the properties of the distributions assumed and the conditions of initialization, and it is more robust in converging to near optimal solutions.

A Decision Making Method for Selection of Finish Process for a Cylindrical Surface

Varinder Singh¹, Vishnu Prakash Agarwal², Prasanta Deb¹

¹Bits Pilani K K Birla Goa Campus, India

²Thapar University, India

In the present paper, fuzzy-scale-based multiple attribute decision making (MADM-TOPSIS) method has been reported to rank five different alternative finishing processes for an internal cylindrical surface through systematic multi-attribute based evaluation. The mathematical procedure yields a suitability index which is used to rank finishing processes. The present TOPSIS-MADM method indicates that the honing process is the most suitable finishing process for the internal cylindrical surfaces whereas on the other hand, the processes like ultra sonic machining and abrasive flow machining are not desirable when they are to be considered for finishing an internal cylindrical surface.

A Decision Analysis on the Optimal Timing Under the Uncertain Cost of Urban Logistics

Tyrone T. Lin¹, Chun-Chen Shih²

¹National Dong Hwa University, Taiwan

²National Chengchi University, Taiwan

This paper applies the real options approach to sort out the carbon management strategies for an urban logistics corporation to reduce the carbon emission, and measures the potential gain or loss under the green logistics cost concept. Hence, the paper divides different corporation-level investing circumstances into three stages (i.e., no other change stage, carbon offset stage, and internal system upgrade stage), and the proposed model tries to point out the threshold of the stage switching, which can be evaluated by the optimal timing under the uncertain carbon price. It also can obtain the potential benefit from strategy execution which is measured by the determination of the optimal timing and expect the carbon price under the uncertain cost of urban logistics.

The Decision Analysis of Market Entry with Game Options Concept

Tyrone T. Lin¹, Chia-Fang Wu¹

¹National Dong Hwa University, Taiwan

This manuscript introduces the concept of game options pricing model to build an approach by the decision analysis to create a bi-national market and two firm's competitive market entry behavior. The production system, market entry, and marketing strategy will face high risk uncertainty in the future; the flexible management value derived from decision-making is not only made now, but may be also made in the future. The project value for the market entry strategy can be evaluated by the real options approach which combines the mixture strategic game concept so as to decide the entry threshold, entry timing, and expected potential market entry value. This game options approach can provide the other concept for the decision analysis in some optimal solutions which is evaluated by the traditional approach of operational research.

Using Multiple Criteria Decision Analysis for Supporting Decisions of Business Process Management

Ana Carolina Campos¹, Adiel Almeida¹

¹Federal University of Pernambuco, Brazil

Many companies are engaged in increasing their productivity and improving the quality of their products and operations. A means to achieve such improvements is to adopt Business Process Management practices. Techniques to analyze, evaluate and improve business processes are deemed Business Process Modeling. Currently, there are several methodologies and techniques for modeling to choose from. The business process modeling method selected for modeling can directly impact on the result of BPM. Therefore, in order to help both academics and practitioners, a model is proposed that will sort business process modeling methods based on the objectives of modeling using the ELECTRE TRI method. This model can serve as a basis for evaluating modeling methods, and thus act as a guide for organizations and serve for a pre-analysis that may support future choice. We use a Product Development process in an automobile company as an example to demonstrate the model.

Spatial Detection of Manufacturing Shift in Mean

Chen-ju Lin¹, Chen-yu Lin¹, Yen-ting Chen¹

¹Yuan Ze University, Taiwan

The development of Statistical Process Control mostly focuses on temporal data. Those techniques are not sufficient for analyzing the manufacturing information embedded with spatial structure. The monitoring process that treats manufacturing records as purely multivariate data would miss important information of spatial relationship among the records. Thus, this paper proposes a spatial-EWMA test procedure to identify process mean shift in a plane. The goal is to analyze whether there is an outbreak cluster in the investigated area. The proposed method uses relative distances among observations to construct test statistics. The observations which are far away from the outbreak center receive smaller weights since they tend to be less influential. The simulation results show that the detection power of the spatial-EWMA test procedure is preferable to the classical multivariate control chart like T2 chart even in the high dimensional scenarios.

Session	Decision Analysis & Methods (3)
Date	8/12/2010
Time	15:30 - 17:15
Room	NAPLES 2703
Chairs	Kwa-Sang Chin; Jin Han Park

What Affects the Decision-making Consumers Consumption of Luxury Goods: An Evidence Case from China

Yong Zhang¹, Jikun Fang¹, Hao Zhang¹, Zheng Cui¹, Xiaojuan Fan¹
¹Beijing Technology and Business University, China

This research aims to explore the laws governing the drives and motives of the luxury consumption motivation based on the luxury and conspicuous theories. Firstly, this research analysis and discuss four-dimensionality of conspicuous consumption of luxury goods of Chinese customers. Then, the authors evaluate the four factors of influence include luxury brands, patron status, fashions and experiences, and found that the brand and status symbol factors had higher influence rate. The conspicuous consumption of luxury four-dimensional structure within Chinese customers was verified in this paper.

Analysis of Competitive Advantages - Approach of Transnational Interregional I-O Table

Mei-Chen Lo¹, Toshimasa Osaki², Martin Drozda³, Gwo-Hshiung Tzeng⁴
¹National United University, Taiwan
²Nagoyagakuin University, Japan
³Leibniz University of Hannover, Germany
⁴National Chiao Tung University, Taiwan

The basic picture and framework of the Transnational Interregional Input-Output (I-O) Table cross countries is introduced, and conventional impact analyses will be conducted to capture cross-border transactions and inter-linkages, from one region to another region, and vice versa. Also, the relationship between regional linkages and the import/export trades will be investigated. The I-O tables-received were used to consider different scenarios of the regional development such as the well-balanced scenario, the inertia scenario, and the scenario of economic development followed by loading of idle capacities. The I-O analysis applied to estimate business ecological situation in a region varying the total output or final demand indices. Instantly, the evaluation of the total investments required for nature protection activity is possible as well. This study also has analyzed FDI strategies via a scenario of increasing consumption up to normative standards among population. The simulations were made to estimate multiplicative effects caused by upsizing industries in the regional economy. Furthermore, from a macroeconomic perspective, structural changes may alter the relationship between the construction sector and other sectors. With this view, it is possible to explore the capability of I-O tables in tracking inter-sectoral relationships and explaining changes in such relationships with respect to structural changes. Lessons are expected to be learned from comparing the patterns of change of one sector of an economy against other sectors.

Advanced Sales and Operations Planning Based on Integration of Physical and Financial Flows

Jun-Zhong Wang¹, Ping-Yu Hsu¹
¹National Central University, Taiwan

Traditional sales and operations planning (S&OP) focus on balancing between supply and demand in a company. It is utilized to ensure the alignment of plans supporting the business strategic goal. An obvious drawback of past decision models is lacking in considering financial planning. The paper proposes a new global S&OP planning model integrating financial flows and physical flows in a company supply chain to evaluate the benefit with various scenarios. The feasibility of the proposed model to the financial issue is demonstrated with a case study. We discuss the sensitivity of cash flow to the changes of payment terms and credit limits. The significance of this study is to adopt the integrated model as a decision support tool thereby enhancing the coordination between financial and physical activities.

Ranking of Product Alternatives Based on Customer-Designer Preferences

Sanjaykumar Gangurde¹, Milind Akarte²
¹K.K.Wagh Institute of Engineering Education and Research, India
²National Institute of Industrial Engineering, India

In this research paper the alternatives of vacuum cleaners are ranked using MADM methods such as Simple Additive Weighing (SAW) Method, Weighted Product Method (WPM), Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) Method, Modified TOPSIS, Grey Relational Analysis (GRA) and Preference Ranking Organization Method for Enrichment Evaluations (PROMETHEE). The results of various methods are then compared. A new approach based on quantitative approach for comparison of alternatives in case of tie is suggested in this work. It is observed that this quantitative approach provides better guidelines to the decision maker, than that provided by qualitative approach applied by earlier researchers.

A Preliminary Study on Design and Development of Template-Based for License Plate Recognition System Applying Artificial Coordinates Auxiliary Techniques

Bih-Yaw Shih¹, Chen-Yuan Chen², Jin-Wei Kuo¹, Po-Wei Chen¹, Tsung-Hao Chen³, Po-Hsuan Huang¹, Pei-Yin Chung¹, Wan-I Lee²
¹National Pingtung University of Education, Taiwan
²National Kaohsiung First University of Science and Technology, Taiwan
³Shu-Te University, Taiwan
⁴Meiho University, Taiwan

With the rapid improvement of technology and economy, the percentage of transportation, like automobile, gradually increases. However, the number of cars increases, the methods of management stretches lots of problems, such as parking, traffic and thievery. Hence, Intelligent Transportation System (ITS) have been emphasized step by step and set up one after another around the world. In addition, ITS also established in Taiwan on July 20, 1998.

Interactive Permutation Decision Making Based on Genetic Algorithm

Mahdi Bashiri¹, Majid Jalili¹
¹Shahed University, Iran

Multiple Attribute Decision Making (MADM) is an important part of decision science which helps us to select a preferred alternative among many alternatives which are compared with conflicting criteria. So, many solution approaches have been introduced such as permutation method; Interactive Simple Additive Weighting Method (ISAW) an etc. The time of the solution is sensitive to the size of the problem (numbers of alternatives and criteria), so by using meta heuristic we are trying to conquer this problem. In this paper, first we want to find an initial solution with permutation method based on genetic algorithm then by using ISAW method we try to propose proper exchanges in each iteration. By the proposed approach we can find the best permutation of alternatives by improved Genetic Algorithm. Finally the proposed approach will be illustrated more by some numerical examples.

Coastal Vulnerability to Sea Level Rise: A Spatio-temporal Decision Making Tool

Oz Sahin¹, Sherif Mohamed¹
¹Griffith University, Australia

Due to uncertainty in the timing and magnitude of Sea Level Rise (SLR) impacts, it is difficult to determine whether taking a specific action to prepare for SLR is justified. The dilemmas confronting decision makers are: when, where and how to adapt to SLR. To address these issues, this research introduces a recently developed model linking Geographical Information Systems (GIS) with System Dynamics (SD) modelling to present realistic time series scenarios of SLR across coastal communities. The hybrid GIS-SD model provides a multifaceted assessment by going beyond detailing year specific land use impacts through linking these outputs with socio-economic SD modules. As a result, the model provides the potential to address temporal and spatial problems concurrently. The methodology formulated from this assessment process, could potentially be utilised by coastal communities to identify and evaluate effective adaptation alternatives for reducing SLR impacts, and to inform long-term decision making.

Session	Technology & Knowledge Management (1)
Date	8/12/2010
Time	11:00 - 12:30
Room	NAPLES 2603
Chairs	Prattana Punnakitkashem; Poul Kyvsgaard Hansen

Does Internet Self-Efficacy Affect Knowledge Sharing Behavior?

Pei-Lee Teh¹, Jessica Sze-Yin Ho¹, Chen-Chen Yong², Siew-Yong Yew²

¹Multimedia University, Malaysia

²University of Malaya, Malaysia

There have been many studies for knowledge sharing within the organizational communities, yet very few research has been done on the factor of internet self-efficacy affecting the individuals' knowledge sharing behavior. Drawing from the theory of planned behavior (TPB), this paper examines the relationships between the internet self-efficacy, attitude toward knowledge sharing, subjective norm, perceived behavioral control, intention to share knowledge, and knowledge sharing behavior. Survey questionnaires are administered to 301 university students. Results indicate that the internet self-efficacy significantly affect the attitude toward knowledge sharing. Intention to share knowledge is predicted with more favorable attitude toward knowledge sharing, subjective norm, and perceived behavioral control. Intention to share knowledge also significantly influences the individuals' actual knowledge sharing behavior. This paper concludes with a discussion of research implications of the study.

Detecting the Valley of International Academic Collaboration in Renewable Energy

Hajime Sasaki¹, Yuya Kajikawa¹, Kenzo Fujisue², Ichiro Sakata¹

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An innovation model providing a solution for climate change and sustainable economic growth is required. In this scenario, renewable energy is one of the most promising technologies. Its research requires a considerable amount of R&D expenditure and various core technologies. Therefore, international research collaboration is effective for prompt and efficient development. With countries and organizations contributing to the rapid growth of knowledge, the meta-structure of international research and collaboration has become ambiguous. This paper aims to establish a knowledgebase that can help prepare international research collaboration policies. This paper demonstrates research capacity and international research collaboration in solar and fuel cell technologies, using MAPs gathered from 68,000 research papers. The two technologies are compared and international research collaboration is analyzed. A valley of research collaboration in Asia and a gap between the research collaboration structures of the two technologies are identified, and the context of this gap is discussed.

Technology Acquisition in Functional Chemicals - An Empirical Study on Phase Difference Film

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FPD films have a large market size in the functional chemical industry and it has a great significance to study the method of technology acquisition. In this study, we conducted a comparative research on the technology acquisition method of equivalent products for each organization with or without raw materials of phase difference films. The result of this study indicated that no significant differences were seen for a product development between with or without raw materials, however during a process development, it indicated that organizations holding raw materials had a higher level of technology accumulation during the phase of a production process and are capable of conducting product development more effectively.

A Correlation Analysis on Service Innovation and Management for the International Roaming Inbound Business

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This paper analyzes the effects of the service innovation and customer relationship management on the international roaming inbound business performance. One dependent variable is the total revenues from roaming generated by its top 69 roaming partners. The independent variables are including the average revenue per user of roaming partners' customers, the network specification level of roaming partners, the level of high speed downlink packet access of roaming partners' network, the bilateral roaming services launched between the case mobile company and roaming partners, the extent of the discounted inter operator tariff between the case mobile company and roaming partners, and the number of inbound roaming customers. The empirical results can help the case mobile company establish concrete standards to measure the operating performance of roaming business in order to provide a beneficial direction for the future business. Besides, it contributes a long-term development of mobile inbound roaming business in the future.

An Efficient Development Process for an Innovative Transport Unit

Sebastian Jursch¹, Sylwia Jalocho¹, Eckart Hauck¹, Sabina Jeschke¹, Klaus Henning¹

¹RWTH Aachen University, Germany

The development of a MegaSwapBox (MSB), an innovative transport unit that can transport goods trimodally via rail, road and waterways (short sea and inland shipping), marks an important step towards reducing traffic congestion. The successful development of such an MSB significantly depends on an efficient and economical developing process which allows an effective development from the first idea up to the construction and testing of a prototype. This paper focuses on the development process of such a MSB. It includes methods like an as-is analysis and a requirement specification. An approach for a structured development process, as well as a workshop concept that is used for an effective solution finding are applied. An extended evaluation of the profitability and usability of possible designs leads to the construction of a prototype with the suitable design. This development process will be applied within the TelliBox project "Intelligent MegaSwapBoxes for Advanced Intermodal Freight Transport".

Knowledge Sources, Innovative Activity and the Performance of UK New Technology Based Firms

Panagiotis Ganotakis¹, Jim Love¹

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We present an innovation value chain analysis for a representative sample of new technology based firms (NTBFs) in the UK. This involves determining which factors lead to the usage of different knowledge sources and the relationships that exist between those sources of knowledge; the effect that each knowledge source has on innovative activity; and how innovation outputs affect the performance of NTBFs. We find that internal (i.e. R&D) and external knowledge sources are complementary for NTBFs, and that supply chain linkages have both a direct and indirect effect on innovation. NTBFs' skill resources matter throughout the innovation value chain, being positively associated with external knowledge linkages and innovation success, and also having a direct effect on growth independent of the effect on innovation.

Session	Technology & Knowledge Management (2)
Date	8/12/2010
Time	13:30 - 15:00
Room	NAPLES 2603
Chairs	Chui Young Yoon; Panagiotis Ganotakis

Mapping the Relations Between Technology, Product, and Service: Case of Apple Inc.

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Nowadays, innovations of technologies, products, and services occur interdependently. Moreover, the innovations are developed by various actors, not by a company alone. Due to the complexity of innovation ecosystem, companies have difficulties in managing and monitoring its complex and interdependent innovation ecosystem. In this manner, this paper suggests a comprehensive network named as "T-P-S map", which is a framework for exploring the connection of technologies, products, and services. As an illustration, a case of Apple is represented, illustrating relationships between the Apple incorporation's patents, product information especially iPhone series, and service applications in the App store. To define the linkages, patent analysis and text analysis are employed. The resulted network will be interpreted in three ways and it can give some managerial information.

Create a Proactive Knowledge Sharing Platform Through Specific Supplier Network and Location Investment

Tung-Hsien Chen¹

¹National ChengChi University, Taiwan

This paper explore how Taiwan wireless communication subcontractor improve inter-organization knowledge learning from his customer through dedicated supply network investment and specific location investment, commonly named VMI (Vendor Managed inventory) and RMA (Return Merchandise Authorization). The results show, dedicated supply network investment redirect knowledge flow direction and specific location investment enhance knowledge flow intensity and variability from customer to subcontractor. Both have significant contribution on subcontractor inter-organization learning.

Profiling Chinese Nano-Biomedical Science in a Decade

Ruimin Pei¹, Alan Porter², Peng Gao¹

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²Georgia Institute of Technology, United States

This paper analyzes nano-biomedical science in China for the period 2000-2009 via bibliometrics and tech mining. The article identifies trends over time, interdisciplinary of nano-biomedical science and other subjects, journals in which Chinese authors publish their research, major institutional contributions, and international collaborators and collaboration networks in this field. This paper finds that Chinese NBMS has grown fast in the last ten years, and has the growth potential via the trend analysis; China has been one of the cores in NBMS, collaborating with other prolific countries; Chinese Academy Sciences, Zhejiang university, Tsing Hua university, and Fudan University occupy the leading positions in the field of NBMS in China; but the distribution of the research centers is separated; NBMS is interacted with other disciplines like chemistry and physics according to science overlay maps.

The Interrelationship Among Learning Environment, Knowledge Process and New Product Development Performance

Ningning Jing¹, Chen Yang¹

¹Hohai University, China

Knowledge process is the core process in new product development, and is also an organizational learning process which is affected by learning environment. In this paper, an empirical research was conducted to explore the mechanism and paths of the interaction among learning environment, knowledge process and new product development performance. The findings indicate that the learning environment is directly and positively related to knowledge process of new product development and thereby influence the new product development performance; Knowledge process which acts as the core process in new product development is directly and positively influence the new product development performance.

A Method for Assessing Patent Similarity Using Direct and Indirect Citation Links

Hsiao-Chung Wu¹, Hung-Yi Chen¹, Kung-Yen Lee², Ying-Chieh Liu¹

¹Chaoyang University of Technology, Taiwan

²National Taiwan University, Taiwan

Assessing patent similarity is a fundamental and critical step in patent citation analysis. When evaluating a similarity for two patents, consider both direct and indirect citation links for them leads more precise similarity assessment. This study proposes a method for assessing patent compound similarity that includes direct and indirect similarities. Given a direct similarity matrix that represents a patent citation network, the method calculates indirect similarity matrices and then obtains a compound similarity matrix. keyword analysis in the text mining is employed to obtain a similarity for a pair of patents. In addition, two criterion are proposed for validating the compound similarities for the patent citation network.

Inter-organizational Knowledge Transfer Effectiveness in New Technology-Based Firms: A Relational and Empirical View from South Africa

Kai-Ying Chan¹, Leon Oerlemans², Marthinus Pretorius¹

¹University of Pretoria, South Africa

²Tilburg University, Netherlands

The open innovation model often neglects the frictions that external knowledge flows may encounter when crossing organizational boundaries. This study recognizes three types of barriers (organizational, technological similarity and contact frequency) and investigates the impact of these barriers on knowledge transfer effectiveness by using data on new technology-based firms located in the emerging South African economy. Empirical results show that these three types of barriers, which exist in inter-organizational knowledge exchange relationships, do have an impact on the usefulness of knowledge received. The findings stress the relevance of a relational approach, as factors derived from it act as barriers to effective knowledge transfer for small firms.

Session	Technology & Knowledge Management (3)
Date	8/12/2010
Time	15:30 - 17:15
Room	NAPLES 2603
Chairs	Dotun Adebajo; Hung-Yi Chen

Application of Production Management Principles to Engineering Processes: An Explorative Study

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The capability to develop high quality products and processes constitutes the competitive advantage of many engineering companies. In production management, numerous tools exist for improving both effectiveness and efficiency. This study explores the applicability of these production management principles to engineering management. An academic focus group and engineering managers in seven German companies were interviewed and the application of several methods was identified. The outcomes confirm that the application of production management principles to engineering processes is related to the degree of novelty that is inherent to engineering projects in companies. Furthermore, the application of production-based methods needs to be embedded in a structured engineering process to be useful in a company. However, most engineering management approaches focus on effectiveness rather than efficiency.

Challenges and Approaches to Customer Development in Co-located High-tech Start-ups

Dotun Adebajo¹

¹University of Liverpool, United Kingdom

The paper presents findings of a study of entrepreneurial start-up organisations in the ICT sector. The start-up organisations were co-located in a new business incubator managed by a university in the north-west of England. The study was aimed at understanding the factors and approaches that impacted the ability of the start-ups to manage customer development and, consequently, generate revenue. A longitudinal case study methodology was adopted and the case study was split into five mini-studies. Semi-structured interviews carried out at six-month intervals were used to generate qualitative data. The study indicated that the start-ups faced capacity constraint and skills issues that negatively impacted customer development. In addition, there was no consensus on the impact of co-location on customer development. However, there was an indication that incubator managers need to provide more strategic support for start-ups with respect to customer development.

Measuring Individual IT Capability to Efficiently Perform Business Tasks in an Enterprise IT Environment

Chui Young Yoon¹, Jae Soo Yoo², Young Ju Bae², Soon Suk Chung², Ji Chul You², Seung Kweon Hong²

¹Chungbuk National University, South Korea

²Chungju National University, South Korea

This study presents a tool for measuring an individual IT capability to efficiently execute the given tasks on an enterprise IT environment. We developed the measurement items for an individual IT capability based on the previous literature. This research proposed a 13-item scale that can totally measure individual IT capability through a validity and reliability test. The developed tool has four measurement factor and thirteen items. The actual utilization of the tool is confirmed by applying it to a case study.

An Incremental Approach to Support Realization of Modularization Benefits

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¹Aalborg University, Denmark

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In general, the phenomenon of managing modularization is not well known. The cause-effect relationships between modularization and realized benefits are complex and comprehensive. Though a number of research works have contributed to the study of the phenomenon of efficient and effective modularization management it is far from clarified. Recognizing the need for further empirical research, we studied 40 modularity cases. Then we develop a research framework with the purpose of uncovering the current state. Furthermore, we formulate a tentative model aiming at guiding the platform management process.

A Framework to Analyze Different Intellectual Property Systems

Jiang Wei¹, Xiaolei Kong¹

¹Zhejiang University, China

With many intellectual property protection (IPP) strategies to choose from, firms can protect their intellectual property by using different intellectual property protection systems (IPS), including macro-level IPS, micro-level IPS and meso-level IPS. In order to study the differences of these systems, we construct a framework based on governance theory, the framework containing three dimensions: (1) institutional design of IPS; (2) implementation of institution; (3) long-term survival and continuation of IPP institution. Then we conduct a case study to figure out cluster IPP mode in a cluster of Zhejiang to illustrate our framework at meso-level.

A Systematic Approach to Design a Knowledge Transfer Framework for Process Improvement Projects

Charalampos Daniilidis¹, Thomas Lamperstorfer¹, Rafael Kirschner¹, Andreas Kain¹, Udo Lindemann¹

¹Technische Universität München, Germany

A key factor for a successful organization is the ability to transfer effectively knowledge for one part of the organization to other parts. In this way institutional memory is preserved in an environment of increased employee turnover and created knowledge can be used across the organization. Although diverse studies on the importance of knowledge transfer for a competitive organization and on key factors for a successful knowledge transfer can be found in the literature, there is a lack of a pragmatic stepwise approach to design a knowledge transfer system in an organization. This paper introduces a systematic approach to design and set up a knowledge transfer framework for multiple project environments. Thereby both the transfer and preservation of explicit and tacit knowledge is being discussed. Furthermore, in order to elaborate the steps of the approach process improvement projects are used as a case study and a knowledge transfer and preservation framework is presented which was set up for the Institute of Product Development.

Session	Supply Chain Management (1)
Date	8/12/2010
Time	11:00 - 12:30
Room	NAPLES 2702
Chairs	William Ho; Ruhul Sarker

Strategic Capabilities of Japanese Independent Suppliers

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Because of low profitability recently, large manufacturers in Japan have reduced R&D expenditure, and cannot afford to carry on long-term continuous trading with small manufacturers. This has resulted in an R&D shift from large manufacturers to suppliers, creating a new technological opportunity for the latter. Some of Japan's hi-tech small suppliers tried to be independent, and created a new market by developing advanced high technologies. Using data on patents, this study analyzed the R&D shift from large manufacturers to suppliers and reviewed trading conditions and the innovations of Japanese small manufacturing companies. Moreover, three case studies were conducted on small hi-tech manufacturers located in Yao city, Osaka prefecture, Japan. The results show that these companies realized their competitive advantages by dynamic entrepreneurial management.

A Value-oriented Model for Managing Service Supply Chains

T. He¹, William Ho¹, X.F. Xu²

¹Aston University, United Kingdom

²Harbin Institute of Technology, China

Service supply chain (SSC) has attracted more and more attention from academia and industry. Although there exists extensive product-based supply chain management models and methods, they are not applicable to the SSC as the differences between service and product. Besides, the existing supply chain management models and methods possess some common deficiencies. Because of the above reasons, this paper develops a novel value-oriented model for the management of SSC using the modeling methods of E3-value and Use Case Maps (UCMs). This model can not only resolve the problems of applicability and effectiveness of the existing supply chain management models and methods, but also answer the questions of 'why the management model is this?' and 'how to quantify the potential profitability of the supply chains?'. Meanwhile, the service business processes of SSC system can be established using its logic procedure. In addition, the model can also determine the value and benefits distribution of the entire service value chain and optimize the operations management performance of the service supply.

A Recovery Model for an Economic Production Quantity Problem with Disruption

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¹University of New South Wales at the Australian Defence Force Academy, Australia

Supply chains face risks from various unexpected events that make disruptions almost inevitable. This paper presents a disruption recovery model for a single stage production and inventory system, where the production is disrupted for a given period of time during the production up time. The developed model is a constrained nonlinear optimization program which we have solved using an evolutionary algorithm as well as the LINGO optimization package. It is shown that the optimal recovery schedule is dependent on the extent of the disruption, as well as the cost parameters. The proposed model is seen to be a very useful tool for manufacturers to make quick decisions on the optimal recovery plan after the occurrence of a disruption.

Analysis of Capacity and Cost Heterogeneity in a Vendor Base

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¹Indian Institute of Management, India

Internet based marketplaces have enabled industrial buyers to locate suppliers from geographically diverse locations. This has resulted in increased variations in certain supplier parameters such as capacity and cost among the participating suppliers. In this paper we consider two supplier parameters that can affect the price the buyer pays and the number of suppliers that the buyer will select for award of contract. These attributes are capacity and production cost. We show how the buyer will determine the optimum number of suppliers using a reverse auction mechanism when she does not have perfect knowledge of the suppliers' parameters.

Asset Prioritization as a Modal Integrator in Organizational Logistics Activities

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Supply Chain Logistics has been an extensive and increasingly area of research and development in the late forty years. New approaches and improved decision making tools are central issues to address. The Trade-off Matrix and the Prioritization Matrix are important tools in the fields of attribute prioritization, identification and choice. A case study of application of such techniques in a military environment is presented. Manager's Decision Scenario for the Transportation Logistics Operator is delineated and the associated boarding modal capacity is presented, as well as, its efficiency and functionality in the cargo determination process. Several tables and figures illustrate and show how the Trade-off Matrix was applied and its fairness. Results from the study case demonstrate also how these two tools can be adapted for articles choice for shipment according to previous parameter classification.

Dynamic Multi-modal Transportation Problem

Suk-Chul Rim¹, Ikju Jang¹

¹Ajou University, South Korea

In recent global business, transportation costs have increased due to the dispersed location of manufacturing and distribution facilities all over the world. For longer distances, multi-modal transportation of roads, rails, ships, and planes is necessary to save on transportation costs. Given an origin and a destination, multiple routes are available, with respective lead times and unit transportation costs. In this study, we propose a heuristic solution procedure for a dynamic multi-modal transportation problem, where we determine the shipping amount for each route at the beginning of every period so as to minimize the total cost, while maintaining a specific level of customer service against the varying demand for a single product. Computer simulation is used to explore the behavior of the proposed algorithm.

Session	Supply Chain Management (2)
Date	8/12/2010
Time	13:30 - 15:00
Room	NAPLES 2702
Chairs	Chun-Mei Lai; Jun-Der Leu

Global Supply Network Configuration Considering the Application of Free Trade Zones and Industrial Parks: A Decision Model and Application Case

Yu-Tsung Huang¹, Jun-Der Leu¹, Chih-Hao Wen¹

¹National Central University, Taiwan

Free Trade Zone (FTZ) is a special economic zone that an international businesses can apply to optimize its supply network. Before international businesses apply FTZs, they need to consider the cargo-flows between their business partners in industrial parks. In this research, we develop an economics evaluation model for the international business using the FTZs. At first, the cargo-flows are analyzed. Then, these cargo-flows are modeled by the mixed integer linear programming (MILP) approach. An application of air-cargo FTZ in Taiwan is given to illustrate the applicability of this model. International businesses can utilize this model to evaluate the efficiency and effectiveness of their supply networks using the FTZs and industrial parks.

Minimizing Bullwhip Effect in Supply Chains

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In this paper, the bullwhip effect in a two-stage supply chain with one supplier and two retailers is measured. The customer demand is assumed to be followed an AR(1) model and is forecasted at each retailer by using the minimum mean square error forecasting method. In addition, the retailers employ the base stock inventory policy. Among the findings of this research, it is interesting to note that the bullwhip effect in supply chains will be minimized as the retailers have the same market share.

Optimizing Short-Life-Product Replenishment Policy Considering Random Purchase Cost Increase and Incentive-Dependent Selling Rate

Chun-Jen Chung¹, Hui-Ming Wee²

¹Aletheia University, Taiwan

²Chung Yuan Christian University, Taiwan

To maximize the total revenue and have efficient flow of the supply chain, enterprises engage in implementing quick response and reducing uncertainty of business transition. In this paper, replenishment plan, pricing policy, the effects of scheduling special sale period and purchase-cost increase announcement and lost sale are considered in deteriorating model over a finite planning horizon. We provide a comprehensive analysis to derive the optimal starting time point of special sale, the optimal number of deliveries and the optimal selling price for a deteriorating economic ordering quantity model. The results show that the fixed demand rate, price-dependent demand, the scale of influence on price-dependent demand and risk factor of scheduling special sale are the critical factors in the management of the deteriorating inventory model.

A Supply Chain Performance Measurement Improved with Integrated Methods FDSM, MOO and DEA Part I: A Conceptual of Performance Measurement Framework in Thailand: Frozen Shrimp Chains

Sirirat Pungchompoo¹, Apichat Sopadang¹

¹Chiang Mai University, Thailand

Supply chain performance measurement has become a popular topic. However, the existing performance measure model still lacks providing interaction aspects of key performance indicators (KPIs) and measuring. The aim of this paper is therefore to propose the conceptual of performance measurement. It can be categorized into the five dimensions which are represented in term of Cost, Flexibility, Responsiveness, Quality, and Innovativeness. For next research study, after the data collection process, researchers will calculate and analyze data by using the fuzzy design structure matrix (FDSM) method for grouping KPIs in term of the interaction among KPIs.

The Influence of Total Quality Management, Concurrent Engineering and Knowledge Management in a Semiconductor Manufacturing Firm

Poh Kiat Ng¹, Gerald Guan Gan Goh¹, Uchenna Eze¹

¹Multimedia University, Malaysia

For many years, total quality management, concurrent engineering and knowledge management have won considerable attention from industrial practitioners and academia. However, few studies have been conducted on the influence of these three practices among Malaysian manufacturing firms. Hence, the objective of this study is to analyse the influence of TQM, CE and KM on engineering performance in a Malaysian semiconductor manufacturing firm. For this study, surveys were used to obtain empirical data on these three practices. The 226 responses were analysed using multiple linear regression analysis. The findings reveal that TQM, CE and KM significantly influence the firm's engineering performance with the three predictors explaining up to 53.9% of the variance in engineering performance. The findings of this study are useful to managers, engineers and researchers as it provides insights on specific areas that require adequate attention to ensure effective engineering performance.

Session	Supply Chain Management (3)
Date	8/12/2010
Time	15:30 - 17:15
Room	NAPLES 2702
Chairs	Chandra K Jaggi; Chih-Cheng Chen

Toward a Resilient Supply Chain with Supply Disturbances

Ana Paula Barroso¹, Virgínia Machado¹, Ana Rita Barros¹, Virgílio Cruz-Machado¹

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The Supply Chain (SC) environment is changing. The SC entities exhibit ever increasing levels of complexity and are adopting new philosophies and management practices with the objective of increasing levels of competitiveness. In recent years there has been an increase in the likelihood of disturbances that affect the normal operation of the SCs. These disturbances can negatively affect the SCs, making them vulnerable and reducing their competitiveness, which is a critical factor to the success of organizations/SCs. Therefore, it is fundamental that SCs become resilient to disturbances. Managers must identify the likelihood of the occurrence and severity of disturbances, and take appropriate measures (implement management strategies) to respond to each disturbance, thereby reducing the negative effects of such disturbances on the SC. In this paper we will discuss proactive and reactive management strategies that can be adopted by the SC to make it resilient to disturbances at the supply side.

Waste Electrical and Electronic Equipment Management. A Case Study

Virgínia Machado¹, Ana Paula Barroso¹, Ana Rita Barros¹, Virgílio Cruz-Machado¹

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Owing to new legal requirements, essential changes in the field of Waste Electrical and Electronic Equipment (WEEE) management are expected. In WEEE management, several deciding factors must be considered to maximize benefits at a determined cost. Thus, the main objective of this study is to contribute to more effective WEEE management. Within this contribution, two models are proposed to help in the management of WEEE between Sorting Centres (SC) and Treatment and Recovery Centres (TRC), at minimum cost. A model for assigning the destination TRC for the WEEE of each SC, i.e., where 1 vehicle moves between 1 SC and 1 TRC. Another model is proposed with the aim of introducing joint WEEE management of 2 SCs to 1 TRC. The models are applied on a case study, with approximately one hundred of SCs and ten TRCs. Based on this case study, conclusions are drawn for WEEE decision managers.

Effective Inventory Management of PCBA Production for Mobile Devices

Weidong Lin¹

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This paper describes the concept of the risk pooling and its application into effective inventory management of PCBA production for mobile devices. The application is to aggregate all common components demands of PCBA models and manage them through just in time replenishment with kit-to-lines. Only those unique parts are kitted directly to production lines. The results of the application illustrate that huge inventory reduction can be achieved by aggregating and managing the common components at one location for different PCBA models. In addition, this paper demonstrates the statistical analysis of probability of line disconnections due to the uncertainties of production rates and lead times of kits supply. It indicates that different lot sizes could be applied for different PCBA models in order to minimize the line stops due to the risk of line disconnections.

Implementation of Green Supply Chain Management in Uncertainty

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There has been an increase trend in interest towards firms' environmental sustainability activities to improve environmental practices in their supply chain. This study aims to present linguistic preferences to deal with supplier evaluation of firm's green supply chain management criteria (GSCM) with incomplete information. Nevertheless, the suitable supplier is a key strategic direction in eliminating environmental impact on supply chain management for manufacturing firms. The firm's GSCM criteria and supplier selection need to be unified as a system to improve the firm's performance. The results and conclusions are discussed.

Using QFD to Analyse Demand Chain Management in China for European Winery

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²*Vienna University of Economics and Business Administration, Austria*

The European wine industry is experiencing acute difficulties during global economic crisis. China will be a big potential wine market in the near future. This research illustrates an investigation of wine demand management and explores the influence of different consumer preferences, consumer behavior and traditional culture on the wine-buying decision aiming to design a demand chain for European wineries in China. Consumption data were obtained by desk-based research from some investigation organizations and researchers. The proposed QFD method which provides a communication tool to designers can posit midway between Chinese wine market and European wine production to help European wineries to build a system for entering and developing the wine market in China. Results show that obvious advantages of European wine lie on good quality, brand loyalty and nation loyalty. Among all links of demand chain, wine acculturation and marketing model are the most important success determinants.

Channel Coordination Through Discount Pricing Policies When Demand Is Price and Effort Dependent

Yao Yu Wang¹, Hon Shiang Lau¹

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In this paper, we investigate the performance of discount pricing policies as coordination mechanisms in decentralized channels where demand is sensitive to both price and sales effort. Most related studies have shown that volume discount is an effective channel coordination device. However, our paper shows that, when demand is affected by both price and sales effort, regular volume discount not only is unable to coordinate the channel effectively, but some times it performs even worse than the simple price-only contract. Fortunately, our results show that a continuous volume discount schedule can perfectly coordinate such an effort-sensitive channel.

Session	Production Planning & Control (1)
Date	8/12/2010
Time	11:00 - 12:30
Room	NAPLES 2602
Chairs	Yongzhong Wu; Suksan Prombanpong

Optimization of Group Scheduling Using Simulation with The Meta-heuristic Extended Great Deluge (EGD) Approach

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Many companies apply cellular manufacturing systems (CMS) in order to improve production. One of the most significant problems encountered in production management is the scheduling problem, which has also been proven to be NP-hard. The objectives of the group scheduling problem in manufacturing are considered in order to minimize the makespan, the total flowtime and machine idle time. In this paper, we propose an approach for optimizing the scheduling of manufacturing tasks for all parts of a product family, including exceptional elements; To solve this problem, an Extended Great Deluge (EGD) approach algorithm is applied in order to determine the optimal sequence of parts in each cell, minimizing the makespan and the total flowtime, following that a heuristic method is applied to introduce the exceptional elements. The results of the proposed hybrid approach show a major improvement when compared with those obtained using one of the best algorithms that has so far been presented by other researchers.

Determination of the Pareto-optimal Build Orientations in Stereolithography

John Giannatsis¹, Vassilis Canellidis¹, Vassilis Dedoussis¹

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The selection of build orientation for a given part is one of the most important tasks encountered in the process planning phase of Layer Manufacturing in general and Stereolithography in particular. The orientation selection is by definition a multi-criteria optimization problem in which the operator seeks to achieve the optimum trade-off between cost and quality depending on the given fabrication constraints and requirements. In the present work a solution approach that focuses on the determination of the set of Pareto-optimal orientations is examined. Pareto-optimal orientations could be considered as a set of good choices for the selection of the optimum orientation for both single part and multiple (batch) fabrication. For the construction of this set in a time-efficient manner a Genetic Algorithm is employed. In order to investigate the efficiency of the proposed approach a case study is examined and the corresponding results are presented.

A Hybrid Neural Network- Meta Heuristics Approach for Permutation Flow Shop Scheduling Problems

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The objective of this study is to find a sequence of jobs for the permutation flow shop to minimize makespan. A feed forward back propagation neural network is used to solve the 10 machine problem taken from the literature. The network is trained with the optimal sequences for five, six and seven jobs problem. This trained network is then used to solve the problem with greater number of jobs. The sequence obtained using neural network is used to generate initial population for genetic algorithm (ANN-GA), genetic algorithm using Random Insertion Perturbation Scheme (ANN-GA-RIPS) and Simulated Annealing (ANN-SA). Makespans obtained through these approaches are compared with the Taillard's benchmark problems.

Worst Case Performance Scheduling Facing Uncertain Disruption in a Continuous Casting Process

Purit Thanakijkasem¹, Kiatkajohn Worapradya¹

¹King Mongkut's University of Technology Thonburi, Thailand

Several disruptions (e.g., machine failure, quality problem, etc.) in a steel production often occur in practice and lead to a delay in the production. Many schedule changes in a short period of time lead to an unstable production. Therefore, a robust predictive scheduling, which takes the disruption effect into account, is a more suitable choice for facing the daily small disruption. In this paper, a worst case performance scheduling via Minimax optimization for a multi-continuous casting is presented. By this approach, each uncertain disruption event is defined to be a possible scenario. A set of factory maintenance information (e.g., a machine reliability/availability) is utilized for constructing and illustrating the uncertain disruption model. Two loops of Genetic Algorithm (GA); one searching to find worst scenario for each feasible schedule and another searching for optimal schedule, are performed. The objective function is raised in terms of the steel production costs. The robust performance based on the factory data is demonstrated via Monte Carlo simulation. It shows that the worst case performance schedule can robustly handle the uncertain daily disruption.

A Niche Genetic Algorithm for Two-machine Flowshop Scheduling with Family Sequence-dependent Setup Times and a Common Due Window

Meng-Chang Wang¹, Yunqing Rao¹, Kun-Peng Wang¹

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This paper presents a two-machine flowshop scheduling problem with family sequence-dependent setup times and a common due window. The objective is to minimize the sum of earliness and tardiness according to the common due window. The problem is found to be NP-hard. And a niche genetic algorithm (NGA) with sharing as the population diversity mechanism is developed for it, in which the distance of two chromosomes is defined to measure the similarity between them, preventing premature convergence of a standard genetic algorithm (SGA). Computational experiments in different scales show the effectiveness and efficiency of the algorithm.

Multiple Model Predictive Control of Nonlinear pH Neutralization System

Ayman Hermansson¹, Syafie Syafie², Samsul Mohd Noor²

¹SEGi University College, Malaysia

²University Putra Malaysia, Malaysia

In this paper the control of nonlinear systems using linear models is studied. The control strategy utilizes a piecewise linear description of the process, considered the model bank. The model bank is then combined at each sampling interval, through the application of a Bayesian weight calculator, to render a single linear model describing the system. The linear model is used in a model predictive control (MPC) setting to render the optimal control move. The performance of the setup is simulated for a pH neutralization process, which demonstrates a good following of setpoint changes and quick reduction of oscillations.

Session	Information Processing & Engineering (1)
Date	8/12/2010
Time	13:30 - 15:00
Room	NAPLES 2602
Chairs	Suthep Butdee; Tingting Zhao

Rule Based Business Process Optimization

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¹Tarbiat Modares University, Iran

This paper discusses the problem of business process optimizations applying rule based Process Model. In this study, business process optimization is utilized through changing business process model with respect to business goals. This is due to that we decompose business goals to sub goals to the extent that desired performance measures have been met in business rules via deciding on alternative scenarios for business rule elements. This contrast with the approach of many researches which optimize business processes in work flow level with respect to cost or time efficiency that neglect business goals. The proposed approach has been implemented in the case of dairy industry to optimize "Milk procurement from producer ". Selection between two scenarios including strict black list and non-strict list for process of "milk reception" investigated in simple optimization problem based on proposed approach.

Improving Users Satisfaction by Using Requirements Engineering Approaches in the Conceptual Phase of Construction Projects: The Elicitation Process

Cyril Mauger¹, Thomas Schwartz¹, Jean-Yves Dantan², Lahcene Harbouche¹

¹Public Research Center Henri Tudor, Luxembourg

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The purpose of this article is to define an approach to improve consideration of users' requirements in the early stage of a construction project. The input of the approach is the construction project appraisal and aims to produce a briefing program add-on relative to its business process needs and objectives. Requirements engineering is used as a basis for the proposed methodology, supported by the functional analysis, the quality function deployment and modeling languages. Its first application results focus on the requirements elicitation process. New kinds of information on the secondary school case study relative to its building were found, information missing from the current briefing program and sources of innovation and improvement. The conclusion deals with the importance to develop this kind of framework that could save time and bring more value to buildings through a business-building alignment.

Product Model-based Design Process Modeling in Collaborative Design

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³Nanjing Institute of Electronic Technology, China

The design process is driven by product information in nature. The common workflow model is usually pre-defined and not flexible for the dynamic design process. A new product model-based design process modeling technique is proposed. Product model is defined as design entities, domain models, parameters, and revisions. Data node is added to workflow model to represent input and output information in design process. Product model-based process can be simultaneously created as design proceeds, mapping from product model, without the necessity of template modeling in advance. Design process is executed and controlled by both activity states and data-activity relations. The proposed model is flexible in complex product design especially in conceptual design stage with multidiscipline cooperation and intensive design changes.

Applying Fuzzy Sets for ERP Systems Selection within the Construction Industry

Marco Barreiros¹, Antonio Grilo², Virgilio Cruz-Machado², Maria do Rosário Cabrita²

¹YKK, Portugal

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Construction companies over the last years the have been implementing ERP systems to integrate their business processes and to become more efficient. Due to the complexity of the factors involved in the construction industry, the selection of an ERP system is a difficult process. This paper proposes a methodology by applying the fuzzy set theory to the selection process an ERP system for companies within the construction industry.

Positive Infusion of Propofol Drug During Induction

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¹University Putra Malaysia, Malaysia

²University of Valladolid, Spain

Non-opioid intravenous anesthetic agents such as propofol has been used in anesthesia since 1970's for conscious sedation. In this paper, the study is to regulate syringe pump of propofol infusion during induction. The syringe pump is regulated by using a linear positive controller. The controller is designed that it satisfies positivity in state. The control output is positive and bounded. Effect site concentration is used as a feedback to the controller. Simulation result shows that the controller regulates propofol very well and the BIS responses of the patient are observed that there are no overshoot and oscillation.

A Novel Digit Serial Dual Basis GF(2m) Multiplier

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A novel architecture of low-complexity digit serial GF(2m) multiplier using dual basis representation is proposed in this paper. The architecture of digit serial multiplier is suitable for large word lengths such as those found in cryptographic applications and error correction codes. Digit serial multipliers can give a better trade-off between area and latency in comparison with bit-parallel realization which is costly, and bit-serial realization which is slower. The proposed multiplier is based on an irreducible trinomial and a look-ahead technique that performs the algorithm to calculate the extra elements of the operand represented in the dual basis multiplication process, and is formed by only one cell of tree structure in the MSD (most significant digit) first scheme. Compare to existing architectures, the results reveal that the new multiplier evidently have lower complexity of area and latency.

Session	Information Processing & Engineering (2)
Date	8/12/2010
Time	15:30 - 17:15
Room	NAPLES 2602
Chairs	Yaoguang Hu; Xu Zhang

Creative Design of Solar Energy Portable Lamp Based on Product Gene and Intuition Models

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Intuition process is a very essential in the product creative design stage. A new creative design approach is put forward based on product gene and intuition models. The product gene model and its sequential gene manipulation are established. The intuition process reflects that the thinking of human brain produces qualitative change. An approach of intuition simulation is used by Hebb learning law, Hopfield neural networks and crossover and mutation. The calculating models and the calculating formulas for the creative design are put forward. Finally, this essay offers us the applied examples for creative design of solar energy portable lamp. The better results are obtained in the creative design.

A New Filter Feature Selection Approach for Customer Churn Prediction in Telecommunications

Ying Huang¹, Bingquan Huang¹, Tahar Kechadi¹

¹University College Dublin, Ireland

There is little literature to introduce the approaches for the feature selection, which plays an important role in the customer churn prediction. In addition, due to the imbalanced data classification problem occurring, most of the traditional approaches ineffectively select the important features for the churn prediction. This paper proposes a new filter feature selection approach for customer churn prediction in telecommunications. The main idea of this approach is to calculate the dependency between each input feature and the class. Finally, the comparative experiments were carried out, and the results show that the new proposed feature selection approach is very effective for the churn prediction.

Model Building of Coordination Theory: A Review

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Contingency theorists have developed the basic grammar of coordination theory around the relationship between coordination mechanisms and circumstance like uncertainty, interdependence, work unit size and functional diversity. Recently, conceptual and empirical studies have emerged that offer new opportunities in coordination theory, for instance structure-process modeling. Meanwhile, model building for coordination theory is difficult because modeling requires precise data, while coordination is dynamic and complex involving both behavioral and physical factors. This paper reviews the approaches to the qualitative analysis and quantitative modeling, and then suggests and discusses in detail four common research issues which are critical to the development of valuable theories in this research area. These are setting problem boundaries, collecting data, identifying resources and activities, and verifying the model.

Function-Based Patent Retrieval for Concept Design

Hongtao Wu¹, Haobo Yang¹, Jianhong Ma¹, Runhua Tan¹

¹Hebei University of Technology, China

In concept design, functions of systems are usually described with a verb and a noun. The verb describes the operation that the system applies on the object which is represented by the noun in the functional description. The functional verbs are commonly expanded with its synonyms and antonyms, troponyms and hypernyms to use as stimuli in engineering problems. To reuse previous design resolution in concept design, we propose a function based patent retrieval approach. In the proposed approach, the initial keywords are given based on function representation of 'verb + noun' provided in the Functional Basis, and then the verbs and nouns in the keywords are automatically expanded into verb set and noun set using Functional Basis and WordNet. The expanded verb set is not only used as design stimuli, but also used as keywords for patent retrieval. The expanded noun set is used as keywords in a second search to filter retrieval results. The experiment results indicate that the proposed approach can retrieve more functional relevant patent and facilitate cross-domain patent retrieval.

Robust Tool for Feature Extraction and Its Application

Pawel Blaszczyk¹

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The aim of this paper is to present a new robust feature extraction method. Our method is an extension of the classical Partial Least Squares (PLS) algorithm. However, a robust approach and new weighted separation criterion is applied. This algorithm based on Minimum Covariance Determinant (MCD) approach and new separation criterion called Weighted Criterion of Difference Scatter Matrices (WCDSM). The new separation criterion uses the weighted difference between within and between scatter matrices to measure the separation between classes. Designed algorithm can distinguish between samples from two classes. This algorithm can be applied to low- and high dimensional data variables, and to one or multiple response variables. In order to compare the performance of the classification the economical datasets are used.

Identifying a New Service Opportunity from Potential Needs: User-centric Service Map

Jieun Kim¹, Yongtae Park¹

¹Seoul National University, South Korea

In the era of ubiquitous service, the new service opportunity is closely related to user. User-centric approach takes into account user context in new service development. However, attempts to apply user context is insufficient to identify opportunities, since the opportunity is at least user's potential needs, which are not satisfied yet. In response, this paper proposes a "user-centric service map" to visualize existing services based on a priori dictionary of potential needs and investigates the vacuum to take concrete shape of the opportunities. At first, a potential needs dictionary is constructed as location, event and objective. Next, the service map is developed based on the evaluation of existing services from Apple App Store for each dimension. Finally, a new service opportunity is identified by analyzing the characteristics of vacuums of the service map and exploring how to satisfy the vacuums using related services for reference.

Session	Operations Research (1)
Date	8/12/2010
Time	11:00 - 12:30
Room	NAPLES 2701
Chairs	Yuri Popkov; Chuangyin Dang

Ranking Alternative Production Scenarios Using Super-Efficiency Analysis

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The modern, particularly competitive and demanding operational environment has led many companies to a continuous effort for implementing techniques and evaluating alternative production scenarios, which will allow them to optimize their production processes and reduce their cost. In this study, a consumer goods manufacturing company was selected to implement modern optimization techniques in its production processes and then to evaluate the efficiency of potential changes on its operation as well as to record the problems and difficulties arising in such a case. Data Envelopment Analysis, a linear programming based technique was employed to evaluate the efficiency of twelve alternative production layout scenarios. Those scenarios were created through the application of advanced Group Technology techniques and some basic indices/characteristics were attached to each one of those layouts. Results indicated that more than one of these scenarios can be effective. An additional analysis for ranking those scenarios was conducted using the super-efficiency model. According to the results of this study, nine of the proposed scenarios are efficient and thus significant improvements can be achieved in the system's performance, without actually changing its basic production parameters. It is concluded that both the results of the evaluation and the experience gained during the implementation phase, can be very useful for supporting the goals and decisions of the company.

Complexity and Approximability Results for Robust Knapsack Problems

Fabrice Talla Nobibon¹, Roel Leus¹

¹Katholieke Universiteit Leuven, Belgium

This paper studies robust knapsack problems, for which solutions are, up to a certain point, immune to data uncertainty. We complement the works found in the literature where uncertainty affects only the profits or only the weights of the items by studying the complexity and approximation of the general setting with uncertainty regarding both the profits and the weights, for multiple objective functions. We also propose pseudo-polynomial-time algorithms for some special cases.

A Shortest Path Problem with Random and Interval Variables for Arcs Based on Conditional Value at Risk

Takashi Hasuike¹

¹Osaka University, Japan

This paper considers a shortest path problem with both random and interval variables for arcs and proposes a new risk measure to synthesize both stochastic conditional Value at Risk and order relation of interval values. The proposed model defined by the hybrid conditional Value at Risk is equivalently transformed into a 0-1 mixed integer programming problem. In order to this problem analytically and efficiently, the Lagrange 0-1 relaxation problem using the property of totally unimodular to the shortest path problem is equivalently performed. The numerical example is provided to compare the proposed model with the other standard models.

The Development on Obstacle Avoidance Design for a Humanoid Robot Based on Four Ultrasonic Sensors for the Learning Behavior and Performance

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A behavioral strategy designed for a humanoid robot for the purpose of obstacle avoidance based on four ultrasonic sensors for the learning behavior and performance is proposed and implemented with an autonomous humanoid robot. A mechanical structure with 4 degrees of freedom is designed so that a small-size

humanoid robot named ARSR is able to accomplish three types of walking motion. One experiment is presented to illustrate how the proposed bipedal structure lets the ARSR move forward, turn left and turn right. Four ultrasonic sensors are mounted on the ARSR to obtain environmental information and detect obstacles. Based on the information obtained from these sensors, a decision tree method is proposed to decide upon one behavior from three possible types of movement: walk forward, turn left and turn right. An experiment is carried out to show how the robot can autonomously avoid obstacles to effectively arrive at its destination. Based on the mechanic design and development, we will get a good agreement for the learning behavior and performance.

A Performance Management on Automobile Dealers with Applying Data Envelopment Analysis

Tyrone T. Lin¹, Chia-Chi Lee², Fei-Ting Chang¹

¹National Dong Hwa University, Taiwan

²National Taipei College of Business, Taiwan

This paper analyzes the operating performances of the twenty retailers of two Taiwanese automobile dealers based on the data envelopment analysis combined with the practical experience of the automotive industry. The paper selects important input and output variables to evaluate overall technical efficiency, pure technical efficiency, and scale efficiency for detecting the causes of inefficiency and proposes the improvement comments on project management. The results indicate that there are five retailers presenting relative efficiency at overall technical efficiency during the sample period. The paper looks forward to constructing a complete business operating performance model for enhancing the performances of retailers. The findings can provide useful suggestions for the managers of project management to focus on how to find out and develop the maximum effectiveness by allocating useful human resources fitly for enhancing the operating efficiency on performance management.

Mixed Integer Programming Formulation for Hybrid Flow Shop Scheduling Problem

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²Multimedia University, Malaysia

This paper addresses a complex hybrid flow shop (HFS) scheduling problem confronted in a real industrial environment in which a manufacturing firm provides electroplating service to the electronic and semiconductor industries. A mixed integer programming (MIP) formulation was developed to represent the scheduling problem. Data was taken from the manufacturing firm to test the MIP to in terms of obtaining optimal solution for a reasonable size problem. The developed model was tested with loss and tight due dates conditions. The results indicate the model was able to provide optimal solution to all the cases considered.

Application of Simulated Annealing on Least-Cost Design of Sewer Network

Shuang-Fu Yeh¹, Yao-Jen Chang¹, Min-Der Lin¹

¹National Chung Hsing University, Taiwan

This study employed simulated annealing (SA) to optimize minimum-cost design of sewer network. A sewer network design which contains significantly varied elevations was used as a case study. The results show that SA is able to achieve least-cost solutions which also fulfill all the constraints of design criteria. Based on the average performance of 200 trials, SA exhibits robustness and efficiency for solving sewer network system optimization problems.

Session	Service Innovation & Management (1)
Date	8/12/2010
Time	13:30 - 15:00
Room	NAPLES 2701
Chairs	Yuya Kajikawa; Chien-Liang Kuo

Analyzing Service Quality in Thai Hotel Industry: An Application of the SERVQUAL Model

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This paper has been conducted with the aim to focus on hotel service quality based on 29-characteristic indicators applied from SERVQUAL model by comparing two hotel types namely, (1) the boutique hotel and (2) the business hotel in Thailand. This paper also aims to study the expectation, perception and gaps between customers' expectation and perception on hotel services quality. The key findings from our study are: first, service quality of hotels in Thailand was moderately low; hotels were not able to deliver services as expected; second, customer expectation on services of the boutique hotels was higher than that on the business hotels. The management is able to apply research findings in designing and prioritizing hotel strategies, and to recognize weaknesses of service quality to improve service quality in hotel business.

A Novel RFID Application for Realizing Lean Services Based on Customer Chain Operations Reference Model

Stuart So¹

¹City University of Hong Kong, Hong Kong

The research establishes a structural approach of adopting lean thinking in services by mapping operation processes based on the integration of value stream mapping and customer-chain operations reference (CCOR) model. On this ground, lean services are realized with radio frequency identification (RFID) technology and associated software at customer touch points to improve service level and operation efficiency that eventually increase customer conversion. A case study of an apparel retailer is conducted and the results are satisfactory. The study has practical implications to both retailers and RFID product suppliers that various adoption factors of this emerging technology including ease of use, data privacy, cost advantage, compatibility and time to the market, may influence the implementation of this new initiative.

Creating an Academic and Technological Landscape of Service Innovation: An Analysis of the Citation Network

Naoki Shibata¹, Yuya Kajikawa¹, Junichiro Mori¹, Ichiro Sakata¹

¹The University of Tokyo, Japan

It is widely recognized that the concept of service innovation is significant for innovation strategy and economic growth especially in developed countries. However, since the term "service innovation" represents a broad sense, there is not the common understanding about what is service innovation even among experts. In this paper, we create an academic and technological landscape of service innovation from a number of academic publications and patents. Not only creating landscapes, extracting the gap between science and technology can be extract by comparing the major topics. As a result, there were mainly eight clusters in science and twelve in technology. SSME research domain is so interdisciplinary that each of eight is not so strongly related to others. On the contrary, all major patent clusters are IT-related ones. In other words, the scientific outcomes are not applied into industries. This result suggests we need to accelerate applying the scientific outcomes into industries.

Development of Technology Roadmap for Product-Service System (TRPSS)

Youngjung Geum¹, Yongtae Park¹

¹Seoul National University, South Korea

Nowadays, the body of literature has been almost unanimous for the needs of sustainable production and consumption. A Product-Service System (PSS) is a promising and prevalent concept for this purpose, selling an integrated offering of products and services, rather than selling a single product. Even PSS has received a great attention in both academia and practice; there has been a lack of research regarding the strategic planning of PSS under the systematic methodology. In response, this paper suggests a revised technology roadmap for product-service system (TRPSS), proposing three types of TRPSS by accommodating the different characteristics of PSS. Differentiating the three types of TRPSS, this paper also provides structural differences and implications. This paper contributes to the fields by firstly suggesting a technology roadmap for PSS, a promising and dominant business model today. Suggested TRPSS and differentiated three types of TRPSS can be flexibly used according to the business circumstances.

Fuzzy Measures for Service Quality of Fuzzy Numbers

Cheng-Che Chen¹, Chun-Mei Lai¹, Hsu-San Liu¹

¹Far East University, Taiwan

In order to increase a company's competition edge, the main focus of a management strategy is to improve service quality. Identifying the dimensions of the service quality would definitely help managers in the challenge of improving the service quality. This study is to presents an fuzzy approach to evaluate service quality. Two evaluation indices, optimistic-expectation index (OEI) and pessimistic-expectation index (PEI), are used to evaluate the true perception of service quality from customers. This presented approach is very flexible since the value and domain of the triangular fuzzy number are defined by customer themselves. An empirical study is conducted to illustrate the effectiveness of the presented approach.

Development of Two-layered Service Evolution Map: Structure and Development Process

Bomi Song¹, Daekook Kang¹, Byungun Yoon², Yongtae Park¹

¹Seoul National University, South Korea

²Dongguk University-Seoul, South Korea

As digital convergence has proliferated and multi-functional products have become prevalent, services that utilize product elements such as technologies, functions, and data of products have been increased. Such a phenomenon continues to accelerate with the diffusion of intelligent products like smart phone and open markets for applications, which is boosted by success of iPhone and Apple App Store. Despite the increased importance and attention, however, little attempt has been made to investigate services based on the utilization of product elements. In response, this study proposes a two-layered service evolution map and the development process as a tool for analysis of evolutionary pattern of services based on the utilization of product elements. The proposed service evolution map consists of two layers with the time dimension: product element layer for utilization pattern of products and service layer for evolutionary pattern of services. Based on the service documents describing what the services are, co-word analysis and modified formal concept analysis (FCA) are employed to develop product element layer and service layer, respectively.

Session	Service Innovation & Management (2)
Date	8/12/2010
Time	15:30 - 17:15
Room	NAPLES 2701
Chairs	Zheng Cui; Stuart So

How Trust Links the Association Connecting Use Experience, Word-of-Mouth with Use Intention and Use Behavior - A Case Study on the Service Innovation in the Aesthetic Medical Treatment

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¹Asia University, Taiwan

²National Cheng Kung University, Taiwan

³China Medical University Hospital, Taiwan

The recent rapid economy growth in the Asia region has reshaped the landscape of medicine industry. Aside from the conventional task of cure and treatment, many hospitals has started providing service innovation in the domain of anti-aging, face-lift, and aesthetic medicine, meeting people's needs and demands to pursue rejuvenation. Experience and word-of-mouth (WOM) are two well-established antecedents to the use intention and behavior. However, differing from other sorts of service, the cosmetic surgery as an irreversible process inevitably arouses the concern and retards the adoption. Thus, trust toward the medical institution and practicing physician play the role of facilitator for decision making. Based on Bansal's 'theory of word-of-mouth' and the 'strategic experimental modules' proposed by Schmitt, this study builds and empirically test a conceptual framework involving experience, WOM, trust, use intention and behavior. The finding is that experience weighs heavier than WOM in invoking trust, leading to use intention and behavior. Prospects' levels of income also moderate the links between experience and trust, and between WOM and trust. It has implications with articulating clients' decision making process in adopting the service innovation such as anti-aging and aesthetic reform treatment.

An Exploration of Service Quality Practices in the Chinese Hotel Industry - A Comparison between CMHs and FMHs

Zheng Cui¹, Haoxiong Yang¹, Suyuan Zhang²

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²Peking University, China

China is a late starter in tourism. The government adopted "open door policy" in the late 1970s and began welcoming international visitors. The world has witnessed a boom in tourism in China over the ensuing three decades. Along with the increase of visitors, the Chinese hotel industry developed with high speed to meet these demands. The Chinese hotel industry developed fast. However, from 1994 to present, the Chinese hotel industry keeps on losing occupancy rate and profits. Chinese hotel management attracted more and more academic research interests. However, a number of research gaps existed. In this research, the author tries to gain a better understanding of service quality gaps between CMHs and FMHs in mainland of China by examining that if there are service quality differences via two critical dimensions: technical and functional.

Impact of Waiting Time on Tourists Satisfaction in a Theme Park: An Empirical Investigation

Wenli Li¹

¹Jinan University, China

As service organizations have realized that service is fundamental to establish their competitive advantage, waiting time management has been a subject of much service research. This study aims to explore how waiting time impact on tourist satisfaction in theme parks. The findings from a survey of 102 tourists from the theme park in Shenzhen City in China confirm that perceived waiting time, waiting information and waiting environment are significant determinants of tourist satisfaction. Providing waiting information and improving waiting environment are effective ways to enhance tourists' service satisfaction.

A Two-Stage Discretionary Priority Service System with Markovian Arrival Inputs

Ning Zhao¹, Zhaotong Lian¹

¹University of Macau, China

In this paper, we study a two-stage priority service system in which the first stage can be interrupted but the second stage can not. There are two classes of customers, low priority and high priority. The server adopts the preemptive priority discipline if the service is at the first stage and adopts the non-preemptive priority discipline if it is at the second stage service. By treating the high priority queue as bounded, the steady-state probability vector for the system can be expressed in a matrix-geometric form. We also obtain the sojourn time of an arbitrary low priority customer. The numerical results demonstrate the effectiveness of our approach.

iSIM: A Proposed Methodology for Industrial-oriented Service Innovation

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²Industrial Technology Research Institute, Taiwan

This paper develops a reference framework called iSIM (industrial-oriented Service Innovation Methodology) for service innovation, which focuses on design and plan stage, with its purpose for fostering new service industry development. Our experiences on executing a four-year-long project, namely "Development of technology-enabled innovative service business models" sponsored by DOIT, MOEA, Taiwan is taken as the major input for building up the methodology. The framework-induction process follows Kettinger et al.'s stage-activity (S-A) approach. Eight stages and 20 corresponding activities are identified. Both detailed information and practical guideline about iSIM are discussed in this paper.

Service Science: An Analysis of the Business System of Product Service Companies

Noriyuki Shikata¹, Kiminori Gemba², Keisuke Uenishi¹

¹Osaka University, Japan

²Ritsumeikan University, Japan

The need of businesses that combine products with service has begun to be recognized recently. However, there exist few studies on such businesses, and none that propose corporate strategy for them. Most of the existing service science literature deals with the classification of business types and the methods to evaluate value. This paper explores the product service system with an uncertainty factor and analyzes a case study of the care bed business, expanding rapidly as a result of the growing elderly population in Japan. We also examine the organizational structure of product service companies and offer policy suggestions for managing such companies. The paper concludes with the suggestion that these companies need to integrate and coordinate different activities in the vertical integration value chain, eliminating the uncertainty factor, to maximize performance and efficiency.

Evaluation of PSS Concepts for Successful Shift from Product to PSS: An Approach Based on AHP and Niche Theory

Sora Lee¹, Yongtae Park¹

¹Seoul National University, South Korea

The shift from product to product-service system(PSS) is highlighted as a prevailing trend for sustainability in the manufacturing industry. For a successful shift, the superiority of PSS to customers over product should be distinctly identified. This study defines the superiority index of PSS concept over product, which is computed with the relative importance of value quantified by AHP and the relative superiority in niche gratification based on the niche theory. At this time, classification of value into three types related with transferring from product to PSS is considered as the conceptual framework of the proposed approach. As a relative evaluation method of PSS concepts in a customers' view dealing with many heterogeneous values that remains a void in the previous studies, the proposed approach is expected to effectively aid manufacturers who adopt PSS to systematically evaluate PSS concepts understanding the gains and losses according to the shift from product to PSS.

Session	Quality Control & Management (1)
Date	8/12/2010
Time	11:00 - 12:30
Room	NAPLES 2601
Chairs	Lianjie Shu; Chen-Ju Lin

Evaluation of Production Yield for Process Selection

Chen-ju Lin¹, Hsin-hui Kuo¹

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Process evaluation is a common yet important problem in industry. Among the key measurements such as quality, processing time, cost, and robustness, production yield is one of the fundamental criteria frequently adopted to evaluate the quality level of a process. A process with high yield is better capable of producing products meeting the requirements preset by customers. However, general evaluation procedures that count the number of defectives become inefficient especially when yield rates are high. This paper considers the processes evaluation problem by comparing the yield index Spk of two production lines with high quality. An effective and efficient approach is proposed to solve the problem. The analytical method examines the difference of two yields. The approach requires small sample sizes but sensitively distinguishes production yields. The results provide useful information to practitioners.

Simultaneously Considered the Properties of Cost and Quality for a Control Chart Design with a Gamma Shock Model and Correlated Data

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Recently, both the non-uniform sampling scheme and economic statistical design approaches have been successfully applied to determine three parameters of X-bar control charts (including sample size, sampling interval between successive samples, and the control limits) for monitoring a manufacturing process with increasing hazard functions. Nevertheless, a primary assumption for these cost models is that measurements within a sample are independent. However, the conventional supposition may underestimate significantly the type I error probability for an X-bar control chart. Hence, in this investigation, we develop a cost model that combine Rahim and Banerjee's cost model with Yang and Hancock's multivariate normal distribution model under maximum probability of type I error and minimum value of power to search the optimal parameters of non-uniform sampling interval X-bar control charts for the measurements within a sample being correlated. In addition, an industrial example is applied to indicate the solution procedure. Meanwhile, a genetic algorithm is adopted.

Weighted CUSUM Procedures for Surveillance of Health Events with Varying Population Sizes

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The CUSUM procedure has been popularly used for detecting a shift in the incidence rate of a rare health event. Many CUSUM methods are developed based on a Poisson model with a constant mean number of events. In practice, the expected number of events is likely to vary over time as the population size at risk is not constant but often grows over time. To account for the varying population size, this paper proposes the weighted CUSUM (WCUSUM) method. The simulation results show that the WCUSUM method is more efficient than the conventional CUSUM methods in detecting increases in the incidence rate, especially for small shifts.

Medical Equipment (DXA) Reliability and the Management of Its Quality Control by the Clinical User

Jan Pieter Clarys¹, Aldo Scafoglieri¹, Steven Provyn¹, Olivia Louis², Joanne Wallace³, Jonathan Tresignie¹, Johan De Mey¹

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Dual energy X-ray absorptiometry (DXA) equipment is designed for human and animal research and clinical diagnoses. Controversial impression concerning its use is dictated by various critical appraisals and clinical reports. This study will cross-validate and compare DXA fan beam scanings with direct dissection and computed tomography (CT) scanning data. Twelve porcine carcasses, were measured with DXA and CT before dissection into its major components. Tissue samples were chemical and hydration analysed. The complete skeleton was ashed. This users-quality evaluation confirms that part of the existing problem results from erroneous terminology suggested by the manufacturer. The predictive values of DXA are good. The precision capacity of DXA variables resulted into significant differences indicating that clinical precision for the individual patient is at risk in particular for bone data.

Application of XML for Manufacturing Quality Information Representation Based on STEP

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Quality information required in manufacturing processes is tightly related to design, which ensures the realization of design quality objectives in manufacturing processes. To process manufacturing quality information for design easily and effectively, it is very necessary to represent such information consistently. Firstly, by discussing the characteristics of STEP and XML in information representation, representation framework of manufacturing quality information based on STEP and XML is proposed. Secondly, EXPRESS models of structural manufacturing information are presented. Thirdly, tree structure of process information is analyzed. Fourthly, mapping EXPRESS model of structural manufacturing quality information into XML schema by the methods of early bound and late bound is illustrated in detail. Finally, the unified representation model of manufacturing quality information based on XML is given, and also definition and application process of XML schema of manufacturing quality information are demonstrated.

Application of QFD in Digital Electronics Industry

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This paper presents the application of QFD in design process involving designers and customers of Digital Electronics industry. After acquiring and prioritizing the customer requirements, QFD method is used to integrate the different stages of system design, to enhance the performance of design and development of systems. Process mapping with customer requirements is employed to formulate the "House of Quality". A case study is conducted on, PALMCHIP Corporation, to demonstrate the usefulness of the proposed framework in analyzing the effectiveness and efficiency on performance. This paper explains the QFD method and all the required steps. This model can, ultimately, help in design optimization and a better system development in digital Electronics industry.

Session	Human Factors (1)
Date	8/12/2010
Time	13:30 - 15:00
Room	NAPLES 2601
Chairs	Jianwei Niu; Toraj Mojibi

Only Room for an Ideas Man - or Is There More to CI for the Less Creative?

Helen Wagner¹, Sue Morton¹, Chris Backhouse¹

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This paper looks at the ideas associated with team roles within a continuous improvement (CI) program. It uses a case study approach, with Belbin's team role theory and the Self-Perception Inventory (SPI) questionnaire to assess the naturally adopted roles within two teams at a Slovenian manufacturing organization. Results show that, team members have a wide range of preferred team roles, but few are drawn to the Plant role that provides the creativity needed for effective CI. Conclusions state that the preferred team roles in established teams need to be acknowledged in order for members to feel a valued part of the process. In the future it is suggested that CI programs are more wide ranging to include tasks more suited to all of the team role preferences.

Problem-Identification Workshop as a Future-Oriented Macroergonomic Tool for Managing the Work Environment

Mohammed-Aminu Sanda¹, Ylva Färltholm¹, Lena Abrahamsson¹, Jan Johansson¹

¹Luleå University of Technology, Sweden

This paper looks at the challenges that most organizations face in the management of their work environments, with respect to the tools that they can use to effectively capture both the explicit and tacit knowledge held by their employees for subsequent reuse when decisions need to be made. The problem-identification workshop, which is a macroergonomic tool for enhancing the management of work environment in an organization, was tested in an organization. Participants identified organizational problems, proposed solutions to them, realistically assessed the desirability and possibility of these solutions, and finally recommended action plans to the organization for its short-term, intermediate and long-term design and management of effective work environment towards enhancing work life and productivity in the organization. It was concluded that problem-identification workshop is a good socio-pedagogic method that can be used as an intelligent participatory intervention tool by managers in organizations in the management of their work environments.

Foot Measurements from 2D Digital Images

Shuping Xiong¹, Yulin Li¹, Yi Zhu¹, Jingxing Qian¹, Dong Yang²

¹Shanghai Jiao Tong University, China

²Donghua University, China

Foot measurements play an important role in the design of comfortable footwear products. This study proposed a non-invasive and efficient means to obtain foot measurements from 2D digital foot images. The hardware of the proposed image-based measuring system was easy to set up and the developed measuring system was tested for 9 foot measurements with ten male subjects who were also manually measured. The comparison between foot measurements from the image-based and the traditionally manual measured systems showed that there were no significant differences between two systems on 8 out of 9 foot measurements. The errors on foot measurements from the image-based system were also analyzed and discussed. The proposed image-based system under further improvements may be applied into the online sales of shoes, especially customized shoes.

Designing Lifting Task in Shoe Industry using Genetic Algorithm

Sanjay Srivastava¹, Kamal Srivastava¹, Swati N¹, Yogesh Anand¹, V. Soamidas¹

¹Dayalbagh Educational Institute, India

We present an application of a genetic algorithm (GA) based method to the design of hide-unloading job, an asymmetric lifting task in shoe industry of Agra, India. In India, which has the second largest shoe industry in the world, it is labor intensive and concentrated in the small and cottage industry sector with Agra being a major production hub. Due to awkward postures and high load handling in hide-unloading, workers are exposed to ergonomic hazards. The design of hide-unloading job in the present work with an aim to reduce the risk to back injury in the purview of revised NIOSH equation. We carry out our study in four shoe manufacturing firms in Agra. The study was conducted on a total of 20 workers, 5 from each firm. It is observed that workers assume different awkward postures mainly due to bulky and unstable load handling. The potency of the study is to present multiple optimal solutions to the design problem using GA while meeting safety and productivity requirements in a given workplace environment conditions. Multiple optimal solutions provide greater agility to ergonomist to implement the recommended design solutions.

Measuring Member Performance in Multi-functional R&D Teams: An Empirical Study with GAHP Analysis

Jie Zhu¹, Shuang Chen¹, Qiang Lu¹

¹Shenzhen Graduate School, Harbin Institute of Technology, China

This paper intends to develop a system for measuring team member performance in multi-functional R&D projects. Performance, competence and behavior are identified as the first-level measures, consisting of 16 indicators at the second level. Then we use the survey method to collect data, with effective samples of 162 from 30 multi-functional R&D project teams, and the Group Analytic Hierarchy Process (GAHP) to analyze the data. The weights for performance indicators with different functions are calculated and compared with previous outcome in existing literature. A case study is then conducted to verify the mode with a satisfactory outcome.

Structural Analysis of Approaches for Worker Participation

Uwe Dombrowski¹, Tim Mielke¹, Sven Schulze¹

¹Technische Universität Braunschweig, Germany

The participation of workers is one of the main topics of manufacturing enterprises. The goal is to increase the satisfaction, motivation and thus the productivity of workers, to use the creativity and the knowledge of the whole workforce to improve processes and to reward workers for their commitment. The approaches for worker participation vary widely. Examples would be surveys about labor conditions, participation in planning processes for the layout of their workplaces or employee profit sharing. In the course of a rising spread of lean production systems the degree of participation increases. The common consent for the participation declines as more responsibility is assigned to the worker. In this paper the different forms of participation will be described and clustered. Furthermore, criteria for the selection of adequate methods of participation will be derived.

Session	Human Factors (2)
Date	8/12/2010
Time	15:30 - 17:15
Room	NAPLES 2601
Chairs	Masahiro Aruga; Zhizhong Li

Studying Into Relationship Between Strategy and Organizational Structure at Power Distribution Company for Tehran Province Districts

Toraj Mojibi¹, Mona Milani¹, Yasaman Khalili², Soheil Khorshidi³

¹Islamic Azad University, Iran

²Payame Noor University, Iran

³Ministry of Education, Iran

The present research studies the relationship between organizational structure and the four strategies of Snow and Miles at Power Distribution for Tehran Province Districts. Research findings indicate high complexity and formalization and low centralization at organizational structure. The type of dominant strategy is analyzer strategy. Also the results of these findings show a lack of significant relationship between strategy and centralization of organizational structure, strategy and complexity of organizational structure, and strategy and formalization of organizational structure.

A Modeling Consideration of the Latent Characters of the Information System and Amounts based on the Philosophical and Nervous Elements

Masahiro Aruga¹, Masayuki Aruga²

¹Tokai University, Japan

²The Open University of Japan,

We have already presented the concepts of new information amounts on the communication system among ordinary people and the handicapped persons. During these discussion we have needed the consideration of philosophical elements, for instance, the interpretants of the Peirce's semiotics. In this paper, firstly the historical outline of the communication system and information amounts for the handicapped persons is briefly described. Secondly the consideration of philosophical existences and their structures and their expanded concepts are described on the basis of the Peirce's semiotics. Thirdly the outline of compartment system and the compartment system models based on the philosophical existences are discussed. As a result we consider the developed new information amounts able to be applied to the handicapped situations, and estimate the latent characters of these information systems considering the nervous system on the basis of these compartment system models. And finally the conclusion and further works are described.

Examining the Mediating Effect of Innovative Culture in the Relationship Between Leadership and Knowledge-based Customer Relationship Implementation

Andy, Li Yueh Chen¹

¹MingDao University, Taiwan

This study examined how transformational leadership styles affect innovative culture, and consequently affect the implementation of knowledge-based customer relationship management in the Taiwanese hotel industry. A model of these relationships was created based on earlier research and used Bass and Avolio's Multi-Factor Leadership Questionnaire, a 12-item scale for assessing innovative culture along with questions to assess a multi-dimensional construct for CRM. The model was tested and modified using structural equation modeling. The results generally support a positive relationship between transformational leadership styles, innovative culture and the implementation of KCRM. In particularly, the mediated role of organizational innovative culture was found between transformational leadership styles and the implementation of KCRM. Suggestions for future research are also included.

Sonar-based Obstacle Avoidance Using a Path Correction Method for Autonomous Control of a Biped Robot for the Learning Stratification and Performance

Cheng-Hsuan Tsai¹, Po-Hsuan Huang¹, Wei Chung Chou¹, Chia-Hung Shih¹, Chen-Yuan Chen², Bih-Yaw Shih¹, Chin-Jui Chang³, Cheng-Wu Chen⁴, Tsung-Hao Chen⁵, Wan-I Lee², Pei-Yin Chung⁶

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⁵Shu-Te University, Taiwan

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In this paper, a simple path correction and obstacle avoidance method with a bipedal robot for the learning stratification and performance, using an ultrasonic sensor and electronic compass sensor, is proposed. This bipedal robot was comprised using the Lego NXT Intelligent Bricks. The proposed method is implemented on an autonomous humanoid robot (the ARSR). One ultrasonic sensor and one electronic compass sensor are installed on the ARSR to detect environmental information including obstacles, the distance to the obstacle, and the directional angle of the robot. Based on the obtained information, an obstacle avoidance and path correct method is proposed to decide the ARSR's behavior so that it can avoid obstacles and move effectively to the destination area. Obstacle avoidance experiments are carried out to confirm the effectiveness of the proposed method and confirm the learning stratification and performance.

Feature Extraction of Three Dimensional (3D) Facial Landmarks Using Spin Image

Xin Zhang¹, Na Fan², Xiao Chen³, Linhua Ran¹, Jianwei Niu²

¹China National Institute of Standardization, China

²University of Science and Technology Beijing, China

³Quartermaster Research Institute, China

3D anthropometric data can be obtained more easily than several years ago, but to process 3D data is most challenging and local feature extraction is one of the challenges. To extract local features of a landmark on 3D anthropometric data, numerous methods have been proposed. But the method with high efficiency, good robustness and strong adaptability is still not found out. In this paper, an approach using spin image was adopted to describe the 3D facial landmark features. Two hundred 3D head data of young male Chinese soldiers collected by a Chinese military institute in 2002 were analyzed. Preliminary results show that spin image is highly efficient and robust to pose and lighting. Further investigation is necessary to evaluate the feature descriptive ability of Spin Image in future 3D landmark automatic identification.

Reducing the Risk of Heat Stress Using Artificial Neural Networks Based Job-combination Approach

Sanjay Srivastava¹, Yogesh Anand¹, V. Soamidas¹

¹Dayalbagh Educational Institute, India

We design and implement a system to reduce the risk of heat stress, a recognized occupational health hazard (OHH), in two labor intensive industries using a job-combination approach. A novel feature of the system is employing artificial neural networks (ANNs) as model free estimators to evaluate perceived discomforts (PDs) of workers for different job combinations proposed in the work.

Session	Manufacturing Systems (1)
Date	8/12/2010
Time	11:00 - 12:30
Room	SICILY 2502
Chairs	S.S. Mahapatra; Carman Ka Man Lee

Effective Nesting of Layer Manufacturing Fabricated Parts Using a Genetic Algorithm and a Bottom-Left Ray Casting Procedure

Vassilis Canellidis¹, John Giannatsis¹, Vassilis Dedoussis¹

¹University of Piraeus, Greece

Two aspects have been identified to be the key elements to the effective utilization of Layer Manufacturing (LM) technologies, that is maximization of the build volume and part orientation. The present work examines the utilization of a Genetic Algorithm in conjunction with effective placement rules as a mean of optimizing the build volume of LM technologies. The optimization is achieved via the dense nesting of parts, to be fabricated, on the LM machine platform. The software tool developed tackles the 2D nesting problem associated with the parts projections on the machine platform. The effectiveness and reliability of the proposed methodology is demonstrated via a case study concerning representative "real-world" parts/objects with quite general free form geometry.

Heuristic Procedure for Mixed Model Assembly Line Balancing Problem

Venkatesh Jonnalagedda¹, Balaji Dabade¹

¹SGGS Institute of Engineering and Technology, India

Mixed model assembly lines are imperative for catering to the highly customized demands. Such lines assemble multiple products in an intermixed sequence. Design of an assembly line involves balancing procedure: allocation of work elements into workstations. Assembly line balancing problems are NP-hard even for single model assembly lines and therefore heuristic procedures are often used to avoid the thorny dimensionality issue. Fast, efficient heuristics can be very handy tools for balancing the mixed model lines as the retrieval of feasible solutions is generally sufficient in real life. This paper presents seven priority rules that can be used in conjunction with a station oriented approach to solve Mixed Model Assembly Line Balancing Problem of type - II wherein number of workstations is given. Proposal of the priority rules and station oriented heuristic is based on the knowledge that minimizing cycle time alone is not a sufficient objective for mixed model assembly lines.

A Web-based Collaborative QFD System to Aid Children Backpack Design

Kevin Tseng¹, Cho-Chi Hsu¹

¹Chang Gung University, Taiwan

This research aims to propose a collaborative QFD approach, and to develop a web-based collaborative QFD system. Hence, the proposed system was developed, and an industrial case was chosen to validate the capabilities of the proposed system, which include extraction of advices and comments from cross-field experts, direct connection of the relations between users' needs, and product attributes, elimination of the complexity and error of traditional QFD system, and fill of its deficiency on collaborative system interoperability.

Optimization Problems Related to Triangular Pocket Machining

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This paper deals with optimization of pocket machining operations. The objective of this research is to extend the pocket machining algorithms that ever exist. The development aimed to identify the angle of triangular areas that can reduce the number of steps in the inner portion stage (IPS) process and corner portion stage (CPS) process. This step reduction makes the cutting-tool or cutter path length becomes shorter. With shorter cutter path length the machining time will become shorter too. The reducing of machining time will reduce production costs.

Grinding Path Optimization for The Roll Grinding Machine

Apisak Phromfaity¹, Kawin Sonthipermpon¹, Erik Bohez²

¹University of Naresuan, Thailand

²Asian Institute of Technology, Thailand

In the steel industry the roll grinding machine has become important for maintenance. The rolls always have surface or shape errors after plastically deforming steel slabs to the steel plate. This error affects the manufacturing quality of the steel plate manufacturing process. There are many parameters for the manufacture of the roll grinding machine, such as speed of roll, speed of grinding wheel and speed of moving horizontally etc. The objective of this work is to reduce the surface error of the roll by using a helical path method. One of the important problems with the roll grinding machine is the coordinated control of the spindle axis roll speed and the z-axis speed; a lower roll speed and fast axis movement will make a roll curve error. To reduce this error a helical path was used. The helical path was used for the C-Axis(C-axis converted from the spindle axis). The results were analyzed using a mathematical model to compare the effects of the conventional method and the helical path method. It was found that the helical path method reduced the error by about 7.8 %.

Simultaneous Microchannel Formation and Copper Deposition on Silicon Along with Surface Treatment

Anjali Kulkarni¹, Vijay Kumar Jain¹, K. A. Misra²

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²Harcourt Butler Technological Institute, India

A process for simultaneous surface treatment, micromachining and copper deposition on silicon wafer is reported here. The process addresses three issues viz. surface treatment, micromachining to form microchannels and subsequent copper deposition into this microchannel on silicon surface simultaneously. The suggested process is based on the electrochemical spark phenomenon. At a time, in its conventional form it is used either for machining or for the deposition purposes. With the use of an alternating voltage (AC) supply, all the three phenomena are achieved simultaneously. Microchannels with copper deposition in them are characterized using scanning electron microscope (SEM), and elemental diffraction analysis using x rays (EDAX).

Session	Manufacturing Systems (2)
Date	8/12/2010
Time	13:30 - 15:00
Room	SICILY 2502
Chairs	Kevin Tseng; Nirjhar Roy

Application of Hierarchical Colored Petri Net in Distributed Manufacturing Network

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Colored Petri net (CPN) is a powerful tool for modeling, simulation and analysis for manufacturing system. As the emergency of Distributed Manufacturing System (DMS), CPN has to be extended to competent for larger and more complex model. Meanwhile, DMS becomes an important issue for industry and how to model a complex manufacturing network for better throughout needs further investigation. This paper provides a general structure of DMS, and use hierarchical CPN, which is the extension for normal CPN, to model a simplified DMS. The proposed approach shows huge superiority on modeling large complex manufacturing system which makes the material flow and transitions clearly represented and provides overview and detailed description for DMS.

Manufacturing Cell Formation under Probabilistic Product Mix

Madhusudan Pillai¹, M. P. Chandrasekharan²

¹National Institute of Technology Calicut, India

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Changes in environment badly affect the performance of the cellular manufacturing system (CMS). Changes in environment are generally reflected in the demand of the items, which are produced in the CMS. The variation in demand can be characterised probabilistically. Two ways of characterisation of this demand are discrete random product mix and random product demand. This paper suggests that, a better CMS design will be obtained if the design is prepared for an expected scenario of the production system when the system is subjected discrete random product mix. The expected inter-cell traffic when this design is subjected to all scenarios will be better than the expected inter-cell traffic of a design which is good for a scenario when applied to all scenarios. The inputs for the design of CMS are machine sequence for the various items (component, subassembly or assembly) used in the product, product structure and demand of product.

An Improved Artificial Immune System for Solving Loading Problems in Flexible Manufacturing Systems

Prasant Ranjan Dhal¹, Mohapatra S S¹, Saurav Datta¹, Antaryami Mishra¹

¹National Institute of Technology, India

Flexible manufacturing system (FMS) has been a focal point in manufacturing related research for improving competitiveness. Machine loading problem in FMS is known to be NP-hard problems and its complexity so extensive that even small problems take excessive computational time to reach the optimal solution. Since the problem has been recognized as one of the most important planning problems, it needs to be solved before actual manufacturing. The objective of the loading problems is to minimize the system unbalance and maximize the throughput satisfying the technological constraints such as availability of machining time and tool slots. To ease the tedious computations, and to get a good solution for large problems, this paper proposes an improved artificial immune system algorithm. It demonstrated the capabilities of the proposed algorithm to converge faster and to a better solution than other comparable techniques. For the same cause, the proposed algorithm has been tested over a set of benchmark problems taken from open literature.

A Multi-plant Tolerance Allocation Model for Assembled Electronic Products in Green Supply Chain Management

Feng-Yi Huang¹, Yuan-Jye Tseng¹

¹Yuan Ze University, Taiwan

Due to increased environmental consciousness, customers are aware of the world's environmental problems in the last few decades. The green principles have been expanded to many departments within organization, including supply chain. Green Supply Chain Management (GSCM) covering every stage in manufacturing from the first to the last stage of life cycle has emerged in the last few years. In this research, GSCM is the concept for manufacturing that minimizes waste through product and process design, including the definition of the product construction, production, and recycling. To achieve the concept of GSCM, tolerance allocation for assembling a product needs to consider how a product can be disassembled and recycled before the product is planned to be assembled. In this research, a multi-plant tolerance allocation model for assembled electronic products is presented. Firstly, tolerance allocation model is presented to determine the working tolerance of each of the components. A mathematical programming model is presented to assign the components to the suitable plants with the cost objectives of manufacturing costs and GSCM costs. An example product is tested and illustrated.

Study on Implementation Strategies of EPR-Driven Remanufacturing in China

Yi Wu¹

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Remanufacturing is of great importance to China. Extended producer responsibility, as a new environmental managerial system, provides systematic support to remanufacturing. When following the logic of extended producer responsibility, producers are motivated to exert early efforts at the design stage, and follow up with integrated management over the value chain. The implementation path and implementation conditions of remanufacturing are discussed based on this argument. A case of automobile remanufacturing in China is analyzed with some potential problems identified. Implementation strategies of EPR-driven remanufacturing in China are put forward in the end.

Assembly Planning of Aircraft Based on Polychromatic Sets

Song Wang¹, Jun Hong¹, Yunlong Li¹, Yi Zhang¹, Zongbin Li¹

¹Xi'an Jiaotong University, China

This paper presents a new framework for the assembly planning of aircraft which integrates assembly sequence planning (ASP) with CAPP on the basis of the standardized mathematical model of polychromatic sets. This paper fulfills three main tasks including the selection of location mode and assembly equipments, assembly sequence planning, and assembly process planning based on a unified model, which may bring forward a new development direction in the assembly planning of aircraft.

Session	Reliability & Maintenance Engineering (1)
Date	8/12/2010
Time	15:30 - 17:15
Room	SICILY 2502
Chairs	Jihong Yan; Ming-Der Yang

A Checkpoint Scheme with Task Duplication Considering Transient and Permanent Faults

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²Keimyung University, South Korea

Proposed here is a novel architecture for a faulttolerant real-time system. We employ a checkpoint rollback strategy with double modular redundancy. Main consideration is given to how to recover from both transient and permanent faults without any built-in fault-detection modules or spare processors. Besides state comparison between duplicated tasks, the system has access to the state of the previous checkpoint so that the integrity of a processor can be checked. Using a Markov model capturing the behavior of the proposed scheme, we calculate the probability of task completion against faults that occur in a Poisson process. The optimal number of checkpoints is selected so as to maximize the probability of task completion.

A Study of Applying the Bounded Generalized Pareto Distribution to the Analysis of Software Fault Distribution

Chih-Song Kuo¹, Chin-Yu Huang¹

¹National Tsing Hua University, Taiwan

Software is currently a key part of many safety-critical applications. But the main problem facing the computer industry is how to develop a software with (ultra) high reliability on time, and assure the quality of software. In the past, some researchers reported that the Pareto distribution (PD) and the Weibull distribution (WD) models can be used for software reliability estimation and fault distribution modeling. In this paper we propose a modified PD model to predict and assess the software fault distribution. That is, we suggest using a special form of the Generalized Pareto distribution (GPD) model, named the bounded Generalized Pareto distribution (BGPD) model. We will show that the BGPD model eliminates several modeling issues that arise in the PD model, and perform detailed comparisons based on real software fault data. Experimental result shows that the proposed BGPD model presents very high fitness to the actual fault data. In the end, we conclude that the distribution of faults in a large software system can be well described by the Pareto principle.

Change-Point Modeling for Software Reliability Assessment Depending on Two-Types of Reliability Growth Factors

Shinji Inoue¹, Shigeru Yamada¹

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We often observe a phenomenon that a stochastic characteristic of software failure-occurrence time or software failure-occurrence time-interval changes notably in an actual testing-phase of a software development process. The testing-time when such phenomenon is observed is called change-point. It is said that the effect of change-point on the software reliability growth process influences accuracy for software reliability assessment based on a software reliability growth model (SRGM). This paper discusses a two-dimensional software reliability growth modeling framework with change-point, in which the software reliability growth process is assumed to depend on the simultaneous testing-time and testing-effort factors. Further, we show examples of the applications of software reliability assessment based on a two-dimensional SRGM developed under our modeling framework by using actual data.

Sewerage Rehabilitation Planning

Ming-Der Yang¹, T. C. Su², Nang-Fei Pan³, P. Liu⁴

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²National Quemoy University, Taiwan

³National Cheng Kung University, Taiwan

⁴Feng Chia University, Taiwan

Following the construction completion of the new infrastructures of sewerage, sewerage rehabilitation planning is the major work. This paper presents a systematic sewerage rehabilitation planning consisting of sewer inspection, diagnosis of pipe defects, grading

of sewerage structural conditions, and determination of cost-effectiveness rehabilitation methods and substitution pipe materials. The main purpose of sewer inspection is to acquire closed circuit TV (CCTV) images for diagnosis of pipe defects. For diagnosis of pipe defects, a computer aided approach rather than the tradition manual interpretation is presented, and the overall diagnosis accuracies of above 90% are obtained. Also, genetic algorithm (GA) is used to design an optimization model to find out the multi-optimal sewer rehabilitation approaches. Finally, a set of optimal sewerage rehabilitation plans is searched.

An Investigation Into Whether the NHPP Framework Is Suitable For Software Reliability Prediction and Estimation

Chu-Ti Lin¹, Kai-Wei Tang¹, Jun-Ru Chang², Chin-Yu Huang²

¹National Chiayi University, Taiwan

²National Tsing Hua University, Taiwan

Many software reliability growth models (SRGMs) based on non-homogeneous Poisson process (NHPP) framework have been proposed for estimating the reliability growth of products. However, some concerns regarding the properties of NHPP framework were exposed and discussed while the NHPP models have received considerable attention. Two main concerns are (I) the variance of an NHPP-based model grows as software testing proceeds, which was considered an unreasonable NHPP property for describing software failure behavior; and (II) the numbers of failures observed in disjoint time intervals are independent, which may fails in the early stage of software testing. With regard to Concern (I), we will justify the validity of NHPP framework through a mathematical perspective, i.e. the process of parameter estimation for NHPP models. Considering Concern (II), we will explain why NHPP SRGMs are still workable from the applicable perspectives. As a result, we believe the NHPP framework may still have merit.

Availability Assessment of a Multi-State Repairable Bubble Gum Production System

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¹Sant Longowal Institute of Engineering & Technology, India

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This paper demonstrates a mathematical model based on Markov Modeling of a complex multistate repairable bubble gum production system with an attempt to improve its availability. The preemptive resume priority repair discipline is followed to carry out repairs of sub-units of the system. The failure rates of all the different subcomponents of the system are taken as constant whereas their repair times are taken to follow general distribution. The mathematical model is established using probability considerations and supplementary variable technique. Lagrange's method for partial differential equations is utilized to obtain the state probabilities. The reliability characteristics are evaluated in accordance with practical situation and operational behavior of the system is analyzed. Availability analysis of the system helped in identifying the critical factors and assessing their impact on the system availability. The effect of using single repair facility to perform repairs on priority is compared with employing multi repair facility to perform repairs immediately.

Residual-based Inspection/Replacement Policy for a Deteriorating System with Markovian Covariates

Xuejing Zhao¹, Mitra Fouladirad², Christophe Berenguer²

¹Lanzhou University, China

²Troyes University of Technology, France

This paper investigates a residual-based maintenance policy for a stochastic deteriorating system, which is influenced by a Markovian covariates process. The baseline stochastic deterioration is modeled by a Gamma process, and the covariates process is assumed to be a time-homogeneous finite-state Markov chain. A model similar to the proportional hazards model is used to represent the influence of the covariates. A residual-based inspection scheme, depending on the degradation level as well as the covariates state, is proposed. We derive the optimal maintenance threshold, optimal inspection scheme to minimize the expected average maintenance cost. By Monte Carlo simulations the efficiency of our method is studied.

Session	Project Management (1)
Date	8/12/2010
Time	11:00 - 12:30
Room	SICILY 2402
Chairs	Norbert Trautmann; Luciana Alencar

Project Scheduling with Alternative Technologies: Incorporating Varying Activity Duration Variability

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We look into project scheduling with expected-NPV objective and stochastic activity durations. Individual activities carry a risk of failure, and an activity's failure can cause the overall project to fail. More than one alternative may exist for reaching intermediate project deliverables, and these alternatives can be implemented either in parallel or sequentially. In this paper, optimal solutions to the scheduling problem are found by means of stochastic dynamic programming. We examine the impact of the variability of activity durations on the project's value. We also illustrate that higher operational variability does not always lead to lower project values, meaning that (sometimes costly) variance-reduction strategies are not always advisable.

Preemptive Resource Constrained Project Scheduling Problem with Uncertain Resource Availabilities: Investigate Worth of Proactive Strategies

Mohamad Fallah¹, M.Bahador Aryanezhad², Behzad Ashtiani²

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Resource constraint project scheduling problem under stochastic circumstances have been considered in recent decades where uncertainty is modeled by means of activities' duration. In this paper we study an extension of basic stochastic RCPSP in which uncertainty come to play on resource availabilities. We have also pursued preempt-resume mode in case of activities breakdown due to resource infeasibility. A solution for this variant of RCPSP is defined in two steps by utilizing heuristic procedures for creating initial schedule and adding time and resource buffers in order to yields proactive schedule to cope with adverse effects of uncertainties. Numerical results revealed that proposed procedure yields significant performance gains over the ignorance of proactive strategies.

Factors Influencing Project Quality in the Design Phase of Building Projects. A Case in the Department of Building and Engineering Services of Botswana

Emmanuel Doodoo¹, Corro Van Waveren¹, K.Y Chan¹

¹*University of Pretoria, South Africa*

There were numerous complaints regarding the quality of building projects ran by the Department of Building and Engineering Services (DBES) in Botswana. The aim of this study is to evaluate participants involving DBES projects by using 16 factors in the project design phase which may influence the quality of building projects. Empirical results show that DBES lacks commitment to continuous quality improvement and poor use of lessons learned to improve quality. The key focus area is adherence to project management principles and poor level in this area may contribute towards DBES's poor project quality. Moreover, this study identified 3 types of groups based from the respondents' attributes and explored the differences in group means.

A Two-stage Stochastic Programming Model for Resource Allocation in Project Management

Dongsheng Xu¹, Yinhua Ye¹, Yingna Lu¹, Shujin Deng¹

¹*Sun Yat-sen University, China*

In a large-scale construction project, the project manager needs to allocate many resources, including numerous workers, various kinds of materials, and a lot of cash. Therefore how to allocate resources and to control cash flow ahead of time is particularly important. The general contract and material price fluctuation make the project manager to take great risk. In this paper, we establish a two-stage stochastic programming model which takes price fluctuation, working capital and other necessary constraints into account. We employ a sample-based heuristic to study how price fluctuation affects the progress schedule of the project. We also conduct sensitivity analysis on the parameters of working capital, pay ratio and labor cost.

Optimal Modular Design Policy for Complex Systems in Considering Coordination Costs

Bingyin Bao¹, Suxiu Xu¹, Qiang Lu¹

¹*Shenzhen Graduate School, Harbin Institute of Technology, China*

There have already been a number of managerial and engineering articles that focus on modularity, but none on the issues that the optimal modularity level of complex systems poses in terms of real options and coordination theory. To fill this gap, we develop a modularity profit model based on real options and coordination theory to examine the trade-off between modularity values and costs especially coordination costs. Two key findings are that: (1) In an expensive test and integration environment, it's optimal for an organization to divide a system into fewer modules and run fewer experiments on each, and further reduce the number of independent parallel design when unit coordination cost is high; (2) In a sophisticated test and integration environment, the optimal splitting policy depends on coordination factors such as ex-ante coordination effectiveness and bug-fixing cost, but the optimal substitution policy only depends on unit design cost.

Session	Engineering Education & Training
Date	8/12/2010
Time	13:30 - 15:00
Room	SICILY 2402
Chairs	Fu-Man Hsieh; Seng Fat Wong

Assessing Core Competencies and Their Training Demands for Industrial Safety and Hygiene Professional Engineers in Taiwan

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This study was set out to investigate the contents of core competences and their training demands for industrial safety and hygiene professional engineers (ISHPEs). The contents of 7 core and 35 sub-core competences were developed and used to conduct field surveys to safety and health managers (SHMs) from two types of industry of the high-tech and traditional, respectively. Both the "deficiency" of ISHPEs and the "importance" of each investigated sub-core competence were assessed by the SHMs from each selected industry type using a 5-point Likert scale (5: very high; 4: high; 3: moderate; 2: low; 1: very low). We found that 9 out of 35, and 13 out of 35 sub-core competences were "high deficiency" and "high importance", respectively. The Bayesian decision making process was used to determine the training demand of each investigated sub-core competence. We found that 16 and 14 sub-core competences were determined as "high training demand" for ISHPEs based on judgments made by SHMs of the high-tech and traditional industry, respectively. Among them, 13 were consistently identified by SHMs of the both types should be considered the first priority subjects for conducting on-the-job trainings for ISHPEs.

Learning Construction Procurement Negotiation in an Educational Game

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¹National Chiao-Tung University, Taiwan

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This study aimed to establish a conceptual model for negotiation games, in which multiple opportunities for engineering projects were provided, and players were thus allowed to improve the negotiation profits by integrating different procurement items from different projects. Students were able to play the role of a constructor or a supplier, distinguished by the initial capital or score. Accordingly, the constructor and the supplier reached different outcomes in the game, and the outcomes were put under evaluation and compared with the achievements of all players. The game adopted a rule that both sides of the players kept track of the negotiation process, either with props or on a written recording form. The game was administered in a classroom setting, followed by the administration of a questionnaire, an interview and a test for further exploration on the learning efficacy of this game model.

Applied RFID and Virtual Reality Technology in Professional Training System for Manufacturing

Seng Fat Wong¹, Zhixin Yang¹, N. Cao¹, W. I. Ho¹

¹University of Macau, Macau

Enhancing the professional knowledge in different levels of operator is a critical success factor to advance the performance of manufacturing industry. However, the traditional training system is lack of scientific method to transfer the professional knowledge (tacit knowledge) to the operator. Applied RFID and Virtual Reality Technology in Knowledge-based Training System can convert the tacit knowledge to the explicit knowledge to different levels of operator. The trainee can capture the basic operation skill through the web-enabled and knowledge-based training system. Moreover, the system can provide the working experience and operation history about the production and tool application to the trainee through RFID technology. They can quickly and conveniently search their target tools that will apply the real manufacturing processes without any human-being supervising. The cost of training resource can be saved, because the workload of supervisor or senior operation is reduced. The senior operation can report the updating and real-time situation of production and tools through RFID technology with knowledge-based training system. The closed loop knowledge can enhance the precision level of analysis results of production system. The industry can be sustainable development through this system.

Compositive Support System and Evaluation System Study on Engineering Equipment's Use Course Management

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¹Beijing University of Posts and Telecommunications, China

²Peking University, China

³PLA University of Science and Technology, China

To resolve the complex problem of use course management of engineering equipment, the actuality thought and method for equipment's use course compositive management are mentioned in this paper, and a evaluating index system of use course management system of engineering equipment is established. This paper also discussed the solution to engineering equipment's compositive management support evaluation system based on component technology, which is an open and universal system and can suit to diverse levels and regions. At last, the system component model is put forward. This provides a new methods and ways for engineering equipment's support system, organize framework and management pattern.

Establishing an Energy Education Experience Course Program in Taiwan

How-Gao Hsu¹, Wei-Hsien Huang¹, Hui-Yun Fu¹, Tun-Ping Teng¹

¹National Taiwan Normal University, Taiwan

This research aims to develop elementary school students' energy-saving knowledge through education programs centering on training college students into cadre teacher, who serve as pioneers that would teach young children in camps or in community activities. This informal education mode initially adopted in Taiwan and applied to teaching materials related to energy-saving education development was promoted in three districts of Taipei, Taichung, and Hualian, in which 67 undergraduates participated in teacher-training camps and 202 students participated in energy education experience camps. The records of t-test pretest-posttest in teacher training programs and the result of t-test in questionnaires responded by elementary school students revealed that there existed significant difference in statistical powers, manifesting the high value of this research.

Study of the Ability and the Education System of Professionals on Housing Maintenance Engineering

Yunbo Xu¹, Leilei Gao¹

¹Henan Institute of Engineering, China

Housing maintenance has its own unique characteristics and content, therefore, professional knowledge structure and ability of Housing Maintenance Engineers have a special quality requirement. Currently, because of its historical reasons of China's higher engineering education system, there is a gap between engineering education and housing maintenance system. Based on the analysis, this paper proposes feasible solutions to adapt to China's national conditions on the Education System of the Housing Maintenance Engineers. That is establish the Housing Maintenance Engineer Education System, it include establish and improve the system of higher engineering education, reform of the curriculum structure of higher engineering education, improve the continuing education and so on.

Session	E-business & E-Commerce
Date	8/12/2010
Time	15:30 - 17:15
Room	SICILY 2402
Chairs	Zhaotong Lian; Michael Johnson

Business Communication Experiences in the US, Mexico, and China

Kejia Wu¹, Malini Natarajaratnam¹, Michael Johnson¹, Thanigaivel Kulandaivelu¹

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Outsourcing can provide companies with a competitive advantage in cost. Finding the right company to outsource operations can be a challenge. Part of this challenge is communicating with prospective suppliers. Requests for quotations were sent to injection molders in the U.S., Mexico, and China. U.S. suppliers were found to be more responsive to e-mail and requested more information regarding the quoted component. Chinese manufacturers were more willing to provide quotes and did so in a timely manner. Mexican manufacturers were the least responsive and required the longest lead time to provide a quote. The implications of supplier communication are discussed.

An Empirical Study of User Acceptance of Internet Banking: An Integration of TAM with Trust and Self-efficacy

Hong-Lei Song¹, Shuang Wang²

¹Renmin University of China, China

²China Agricultural University, China

Internet banking has become one of the most profitable e-commerce applications in the last decades by providing advantages for both customers and the bank. However, there is still a large group of customers refusing to use this service. So it is necessary to explore the reasons that influence customer acceptance of Internet banking service. Based on the TAM, this study integrates trust perception and self-efficacy to predict the user intention. A comprehensive research model was developed and empirically examined. Results of the data analysis strongly support the model as well as all the 9 proposed hypotheses..

An Online Group-buying Model Based on Fuzzy Theory

Chu-Chai Henry Chan¹, Chien-Yu Chiang¹

¹Chaoyang University of Technology, Taiwan

Group buying is becoming an increasing important trend for electronic marketplaces. In order to enhance purchase willingness of customers, there is a need to adopt the concept of the bargaining in online group-buying. This research is solved through on process of generating offers by a fuzzy inference system. Three bargaining strategies found in the literature are used in forming strategies of pricing mechanism. Experimental results indicate that our model can be accepted and is used again by most customers. Moreover, the increase bargaining strategy is the most satisfying for customers.

Factors Affecting the Continued Intention of Mobile Shopping

Chuen-Roan Kang¹, Ming-Chien Hung², Shih-Ting Yang², Ting-Chu Hsieh³, Shun-ming Tang¹

¹National Yunlin University of Sciences and Technology, Taiwan

²Nanhua University, Taiwan

³WuFeng University, Taiwan

Although the mobile shopping is convenient for our daily life, some people still discontinue their usage of mobile shopping approach even they already have the experience. The purpose of this study is to understand the factors of mobile shopping continuance. With the survey method, 500 college students of mobile phone users were surveyed and 244 effective questionnaires were obtained for survey analysis. This study conducts survey probing the factors affecting the continued intention of mobile shopping via the variables of confirmation, satisfaction, perceived usefulness, and trust. The results show that trust can improve the explanatory power of initial Expectancy Confirmation Model (ECM). This study also contributes to the m-shopping stores for enhancing their customers' continuance on m-shopping and extends the researches on continuance model of information systems.

Customer Value of Social Network Service Website: Key Components and Impacts on Customer Loyalty

Guozheng Zhang¹, Faming Zhou², Yong Lan²

¹Central South University, China

²Human Agricultural University, China

An increasing number of people are processing social communication online and the numbers are likely to increase rapidly in the near future. It is important to analyze the relationship between customer values of social network service and Customer Loyalty. The purpose of this paper is to answer the following questions. First, what are key components of customer value in social network service? Second, what influences the relationship between customer value and Customer Loyalty? Data collected from 160 respondents who participate in social network service website were used to test a research model. Several managerial implications were derived from the analysis and further studies were suggested.

The Influence of Electronic Word-of-Mouth on Consumers' Quadratic Selection: Based on the Positive Research of Banks in Mainland China

Junfeng Liao¹, Chunyan Zhong¹

¹South China University of Technology, China

Based on Technology Acceptance Model (TAM) predecessors have studied the impact of Internet word-of-mouth on consumer's first selection. However, what is its impact on consumer's quadratic selection? This research, taking the banking industry as a carrier, analyzes the relationship among the credibility of electronic word-of-mouth, trust, perceived risk, attraction and the intention to use. The result of this research indicates that trust and attraction produces a significant positive impact on the intention to use the bank; but the perceived risk is not positively influential to the intention to use to the bank. Simultaneity, it finds that when the intonation of word-of-mouth is different, male and female would have different intentions to use the bank.

The Implications of Virtual Reality Technology in E-commerce

Hana Estifaei¹, Mustafa Riza¹, Hamed F. Manesh¹

¹Eastern Mediterranean University, Turkey

The growth of e-commerce in recent years has opened up new trade avenues for enterprises. It is clear that internet websites in this context are playing an important role as the medium of information dissemination. Many studies have been shown that 2-D representations of products are no longer impressive on websites than before, since demands for custom-designed products are rapidly increasing. In the consideration of the industrial equipments, this situation becomes more important since such equipments are costly to buy. Due to advent of high-speed network and advance in computer graphics, the Virtual Reality (VR) technology emerged as alternative way to resolve problems inherent to the conventional methods by improving presentation ability and flexibility for customers. In this paper, typical motivations are presented to highlight why and how e-commerce can benefit from VR applications. Representative VR applications and potentials are presented in the areas of industrial equipment producers.

Session	Poster Session 1
Date	8/12/2010
Time	All-Day Display
Room	SICILY 2501

A Memetic Algorithm for the Close-Open Mixed Vehicle Routing Problem

Ran Liu¹, Zhibin Jiang¹, Hongtao Hu¹, Shiqing Yao¹
¹Shanghai Jiao Tong University, China

Nowadays in the transportation industry carriers reduce the costs through collaboration, e.g., sharing the assets and tasks with other collaborative partners. In this paper, an optimization problem called the Close-Open Mixed Vehicle Routing Problem (COMVRP) is discussed, that can be used to assist in identifying routes when a carrier serves the customers through his private vehicles and vehicles hired from external carriers. The objective of the problem is to minimize the fixed and variable costs for operating the private vehicles and the hired vehicles. A mix integer programming (MIP) model and an effective memetic algorithm are established for the COMVRP. Computational experiments are conducted. The results show that the proposed algorithm is able to produce high reasonable solutions within an acceptable running time, and always outperforms the robust MIP solver CPLEX.

Development of Integrated Qualitative and Environmental Decision Method

Ratapol Wudhikarn¹, Nopasit Chakpitak¹
¹Chiang Mai University, Thailand

Nowadays, several companies have to apply an appropriate decision-making-method, in order to survive in a high competitive circumstance. The appropriate method is one of the crucial management methods for sustaining a business organization. Since, recently, customers do not only concern about the quality issue, but also environmental concerning has been considerably increased and continually developed. Therefore, this research's main purpose is to develop a new quantification method integrating both qualitative and environmental issues together for a better result. As quality and environmental aspects are dissimilar in term of ranges and units, these differences are eliminated by using a normalization approach. This proposed decision method employed six corrugated roofs. The outcomes present; five developing roofs are environmentally friendlier than the existing corrugated roofs. Still, this ecological benefit is compensated with the qualitative capability.

Developing A Consumer Experience Conceptual Model for the Taiwanese Fine Food Culture in the Restaurant Industry

Ching-Yu Lien¹, Shu-Hwa Hsiao¹, Chih-Wen Huang²
¹Minghsin University of Science and Technology, Taiwan
²Tamkang University, Taiwan

Since the consumption style change, the Experience Economy era is coming now in Taiwan. Taiwan is a paradise of the fine food and owns diversified dietary cultures. It becomes one of the most important dietary cultures in the world. In recent researches, there are few studies are done from the decision-making viewpoints of the consumers to explore their experiences and feelings towards the Taiwanese Fine Food Culture. Therefore, this study aims to explore the experiences and feelings of the consumers towards the Taiwanese fine food culture and attempt to develop a consumer experience conceptual model for the Taiwanese fine food culture in the restaurant industry. To reach the objectives of the research, this study uses qualitative analysis and interviews with eighteen consumers to collect data. This study found a new experience, "Value Experience", which is included on consumption experience of the Taiwanese fine food culture besides the Schmitt (1999) experiential modules.

Calculating Lifecycle Interdependencies Based on Eco-Design Strategies

Clemens Hepperle¹, Nikolas Bradford¹, Francesco Costantino², Robert Orawski¹, Stefan Langer¹, Udo Lindemann¹
¹Technische Universität München, Germany
²University of Rome "La Sapienza", Italy

This paper presents a methodology and corresponding results how interdependencies in-between lifecycle phases deriving from the application of Eco-Design strategies can be identified to support engineering management. Thereby, interdependencies among the phases 'Product Planning', 'Product Development', 'Production

Planning', 'Production', 'Distribution', 'Utilization', 'Maintenance', 'Modernization' and 'Product Disposal' are analysed based on ecological check items. To support a respective systems understanding of the lifecycle, a MDM (Multiple Domain Matrix) approach is carried out. Gained results are interpreted in order to a measure the criticality of singular lifecycle phases and Eco-Design activities. The presented approach thereby shows how different perspectives on the lifecycle can be combined in order to allow a more sophisticated eco-oriented planning of future products. In addition, the presented methodology can be expanded to further Design for X-guidelines to support a lifecycle-oriented planning from further perspectives.

The Relationships Between Green Consumption Cognition and Behavioral Intentions for Consumers in the Restaurant Industry

Ching-Yu Lien¹, Yu-Shih Chen², Chih-Wen Huang³
¹Minghsin University of Science and Technology, Taiwan
²Feng Chia University, Taiwan
³Tamkang University, Taiwan

The concept of green consumption has become a more concerning issue for environmental protection among many countries in recent years, especially in how to apply it to the restaurant industry has become an important development for the restaurant businesses in the future. The purpose of this study is to apply the Theory of Planned Behavior (TPB) to examine the relationships between green consumption cognition and consumption behavioral intentions for consumers in the restaurant industry. In this study, 620 questionnaires for consumers were totally distributed. The effective sample size and response rate for the survey was 435 and 70.16% respectively. The results of this study show that the green consumption cognition, green consumption attitude, green subjective norm and green perceived behavioral control for consumers in restaurants have positively significant impacts. Meanwhile, the green consumption cognition, green consumption attitude, green subjective norm and green perceived behavioral control for consumers have also positively significant impacts on their behavioral intentions of consumption for restaurants.

The Comparison Between MAUT and PROMETHEE

Min Wang¹, S.-J. Lin¹, Y.-C. Lo¹
¹Chaoyang University of Technology, Taiwan

Multi-criteria decision making (MCDM) analysis has been utilized to solve many real world problems. Most research used a particular MCDM method to solve the problem in interested. Recently, some research is interested in comparing the results obtained by different MCDM methods. However, seldom research provides the study about the relation or perspective between those methods. In this study, a preliminary discussion between two of the most popular MCDM methods, multiattribute utility theory (MAUT) and PROMETHEE, is provided.

Regulatory Focus and Recovery Fit in Airline Overbooking

Xiang Zhang¹, Peng Wang¹, Yuehui Wang¹, Guoxin Wang¹
¹Beijing Institute of Technology, China

Improper recovery of overbooked customers may lead to severe results. And the research on the recovery strategy in overbooking is very insufficient. The purpose of this paper is to develop a recovery strategy based on regulatory focus theory. The study predicts that recovery fit can lead to improved customer satisfaction. Using situationally induced regulatory focus experimental design, the results show that the current recovery practices can be classified into promotion versus prevention orientation. Customers under time pressure prefer preventing losses, whereas time enough customers concern more about achieving gains. A fit in recovery practices may bring higher satisfaction for customers than those who are not fit their regulatory orientation. The results may help airline companies make better recovery strategies.

Development of an Adjustable Mold Box for Making Silicone Rubber Mold

Chil-Chyuan Kuo¹, Cheng-Yan Lin¹, Xin-Zhu Wu¹

¹Ming Chi University of Technology, Taiwan

Rapid tooling technology is regarded as an important approach of reducing the cost and time to market for new products. Silicone rubber mold is widely employed in the indirect tooling of rapid tooling technology because it owns flexible and elastic characteristics so that parts with sophisticated geometry can be fabricated. The disadvantages of traditional mold box preparation procedure include time-consuming, more man-power and non cost-effective. To solve this problem, an adjustable mold box technology is proposed and implemented. It is found that the savings in preparation time of mold box is about 98 % and it can be done only by one person using this adjustable mold box technology. The user-friendly man-machine interface is also developed for increasing the efficiency in the manufacturing of the silicone rubber mold.

A New Robust Validity Index for Fuzzy Clustering Algorithm

Hong-Lin Shieh¹, Po-Lun Chang²

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²Lunghwa University of Science and Technology, Taiwan

This paper proposes a robust validity index for Fuzzy c-Means (FCM) algorithm. The Fuzzy c-Means algorithm has become of most widely used method in fuzzy clustering. After clustering, it is often necessary to evaluate its results. Such assessment techniques are called cluster validity. The disadvantage of FCM is that the number of clusters must be predetermined. Even if the number of clusters is given, the clustering results of these algorithms are influenced by the choice of initial cluster centers. In this paper, a new cluster validity index is proposed to evaluate the fitness of clusters obtained by FCM. The example shows the result of proposed index have good performances than other cluster validities.

Analysis of the Harmonics Losses and Bearing Load for Motorized High Speed Spindle Part I: Modeling

Shih-Chang Chen¹, Yu-Ling Juan¹, Chia-Hui Tang¹, Ching-Feng Chang¹, Tsair-Rong Chen¹

¹National Changhua University of Education, Taiwan

Angular contact bearings are the most popular type of bearings used in the motorized high speed spindle. An initial preload and operating-induced load control are managed to ensure its rigidity, but the centrifugal force and temperature will rise with the rapid increase of spindle speed. Although the centrifugal force and thermo induced bearings load are applied on the spindle assembly. This paper aims to study innovative structure solution of spindle and develop a new type of super precision bearings which will ensure the lifetime and high performance of spindle. Section II proposed an improved inverter output filter, for pulse width modulated (PWM) drive system. The proposed filter is shown to effectively reduce the power losses in the spindle. This usage of the filter can improve lifetime of bearings and gain a higher output power of the spindle. The simulations show a 20 KW, 400 Hz PWM drive system with total loss reduced 13.36%, and a 20KW, 800HZ PWM drive system with total loss reduced 15.77%. Therefore, the filter configuration is an excellent contribution for PWM drive system.

Schedulability and Optimal Checkpoint Placement for Real-Time Multi-Tasks

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An optimal checkpoint strategy for fault-tolerance in real-time systems is addressed in this paper. We consider multiple real-time tasks with arbitrary periods that are scheduled by Rate Monotonic (RM) algorithm. Equidistant checkpointing is maintained for each kind of task, while the width of checkpoint intervals is different with respect to the task. We propose a method to determine the optimal checkpoint interval for each task so that the probability of completing all the tasks is maximized. Whenever a fault occurs to a checkpoint interval of a task, the execution time of the task would be prolonged by rollback and re-execution of checkpoints. Our scheme includes the schedulability test to examine whether a task

can be completed with an extended execution time. A numerical experiment demonstrates the applicability of the proposed scheme.

Failure Rate Calculating Method of Components Based on the Load-strength Interference Model

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²Shenyang Ligong University, China

The failure fate model of components based on the load-strength interference model is proposed, and the relationship between the failure rate of components and time in different cases is studied. The existing failure rate calculation methods of components are analyzed, and it is pointed out that these methods for calculating the failure rate of products are all based on the statistic analysis of fail data and can not reflect the relationship between the failure rate and the factors. Then, the failure rate model capable of embodying the effect of load and strength and its degradation is developed with the time-dependent load-strength interference. The results show that for the different combinations of load and strength, the failure rate curves of components are different and have the whole or partial characteristic of bathtub-shaped curve. The method proposed can present the relationship between the failure rate of components and the parameters of load and strength, and it can be used to calculate the failure rate of components accurately as long as the parameters of load, strength and the rule of strength degradation are known. Hence, it is more applicable for the reliability design and the lifecycle management of components.

Time-To-State and Availability Assessment of Multi-state Weighted K-out-of-N: G Systems

Shahrazad Faghihroohi¹, Yanfu Li²

¹National University of Singapore, Singapore

²University of Tennessee, United States

Recently, various models are proposed for complex systems. The multi-state k-out-of-n system is one of the successful models. Because complex systems are often subject to aging process, the system state probability also changes with time. Therefore, we extend the traditional multi-state k-out-of-n system into a dynamic model by including the time factor. Further, based on the fact that most of the systems are in monitoring and recovery functions, the system would return back to higher states after switching to lower states. Therefore, we propose a model to find Time-To-State (TTS) data of reversible systems. For dynamic systems, we propose a framework which includes Universal Generating Function (UGF) and Markov process to model system availability. For reversible systems, a Semi-Markov process is considered and flow-graph and Moment Generating Function (MGF) are applied to derive TTS data. Our method is applied to one real-world marine transportation system.

Admission Control of an M/M/1 Queue with Multiple Deterioration States

Yarlin Kuo¹

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Properly controlled arrival process via accepting or rejecting arrivals can effectively reduce system congestion level. This paper finds the optimal admission policy of an M/M/1 queue which is susceptible to a cumulative shock failure process. Assuming that the server is minimally repaired when it fails and can be pre-ventively maintained at the ends of busy periods, the optimal admission policy of this unreliable queue is of control-limit-type and the optimal admission control limit is such that the controller rejects more arrival when the state of the server deteriorates more.

Modeling Impact of Product Variety on Performance in Mixed-model Assembly System: an Artificial Neural Network Meta-modeling Approach

Yunqing Rao¹, Kunpeng Wang¹, Meng-Chang Wang¹

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The increasing variety of products complicates the mixed-model assembly process and affected the assembly system in terms of product quality and productivity. In the paper, variety induced manufacturing complexity with regard to choices that operators have to make for various assembly operations is measured with

information entropy of the average randomness in choice processes. The impact of error rate associated with the complexity on the performance of the system is analyzed by means of the investigation on average reaction time and speed-accuracy trade-off. In addition, an established artificial neural network meta-model contribute to modeling the impact of product variety on the system performance. The artificial neural network meta-model has superior performance than a MLR meta-model in terms of experiment results and appears to be the optimal approach to modeling impact of product variety on performance in mixed-model assembly system.

Scheduling of Television Commercials

Min-Sun Wuang¹, Chang-Lin Yang¹, Rong-Hwa Huang¹, Shan-Ping Chuang²
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²Huafan University, Taiwan

Advertising income is a vital source of revenue for television stations. The arrangements made when customers purchase television advertising time should consider customer requirements, relevant laws and regulations, and the need to fill all available advertising time. This study presents an ant colony optimization (ACO) heuristic for establishing an effective and simple mechanism for solving the problem of scheduling television advertisements. The proposed mechanism was based on network structuring and recursive calculation methods. In the proposed approach, the scheduling mechanism and ACO heuristics are developed separately, improving the performance of the method in advertising scheduling by varying parameters or settings within the ACO heuristic and enabling the application to be flexibly modified by adjusting the scheduling criterion.

Bond Graph Model of a New Hydraulic Winch Test Bench on Energy Recycle

Mengru Li¹, Baofu Xu¹, Zhixin Chen²
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²Chinese Academy of Fishery Sciences, China

By building the power diagram of the new energy recycle hydraulic winch test bench, analyze the power flow of this system during obverse process. Further, establish the system bond graph model and present its power state equations. Then use Matlab to simulate the energy recycle system models. The system energy saving rate is 57.88% from simulation and 57.08% from test. Compared with the test data, it verifies that this system model simulates the actual working process truly and prepares for optimal design of this system in the future.

Flight Operation-oriented Tunnel-in-the-Sky Design

Xuelin Huang¹, Jiangyun Wang¹
¹Beihang University, China

In order to enhance the indication performance of Tunnel-in-the-Sky (TIS) in the flight instrument to assist the pilots' operation, flight operation-oriented strategies for tunnel are advocated. Dynamic driving strategy for tunnel is proposed to generate tunnel data dynamically, which endows the tunnel with a return-to-path guidance capacity. Transition strategy from the current flight path to the predicted path using Clothoid is applied to improve the tunnel traceability. To intuitively support the pilots' operation and reduce their workload, the estimated flight vector, expected flight vector and their corresponding driving algorithms are introduced. Experimental evaluation indicates the feasibility of the tunnel driving strategy and the valid effect of Clothoid transition. Optimal predictive time parameters for flight vectors are chosen by statistical analysis. These experiments validate the operation-oriented Tunnel-in-the-Sky design.

How Could Non-feasible Constraints Be Located in Predictive Control?

Teresa Alvarez¹, Daniel Briongos¹, Monica Garcia¹
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Model Predictive Control (MPC) is one of the most popular advanced control techniques. One of the reasons is that it takes into account the process constraints in a natural way. But, there are situations (perturbations, not well defined constraints, etc.) when it is not possible to compute a sequence of future controls because some constraints are violated, i.e., the problem is not feasible.

When this sort of problem appears it is necessary to apply some infeasibility handling procedure that recovers the feasibility. Mainly there are two ways: removing constraints or relaxing the limits. But it is necessary to know which constraints are responsible for the infeasibility. There are optimization procedures that have been specifically developed to locate these problematic limits. These techniques will be applied to the control problem and compare to the approaches found in MPC papers.

Algorithm for Obstacle Classification and Lane Line Identification Using LRF Sensors

Hung-Yuan Chung¹, Zih-Yang Lin¹, Hong-Wei Chen¹, Hsiao-Yu Wang¹
¹National Central University, Taiwan

This paper presents an algorithm for obstacle classification and lane line identification using the laser range finder (LRF) sensors, which is used to warn the driver to watch the situation of environment when the obstacle appear in the front. The classification of detecting objects is essential to reduce the danger in traffic. Nevertheless, there may be a noise (or road surface) in far distance. To overcome this, a quite efficient enhancement algorithm of detection, segmentation and classification based on the laser range finder (LRF) is proposed.

A Comparison Study of Five In-vehicle Warning Information Displays with or Without Spatial Compatibility

Jing-Wun Jhuang¹, Yung Ching Liu¹, Yang-Kun Ou¹
¹National Yunlin University of Science and Technology, Taiwan

A driving simulator study was conducted to evaluate the effect of five in-vehicle warning information displays upon drivers' decision performance. These displays include visual display, auditory displays with and without spatial compatibility, hybrid displays in both visual and auditory format with and without spatial compatibility. In this one factor within-subjects experiment, 30 voluntary drivers were recruited to perform various tasks that involved driving, and stimulus-response (S-R). The corresponding driving performance, response times, and accuracy rates were measured and analyzed. Results show that the drivers' best performances were obtained for hybrid display with spatial compatibility. Hybrid displays enabled drivers to respond the fastest and achieve the best accuracy in both S-R.

The Effects of Memory Cue and Memory Aid on Prospective Memory in Older and Younger Adults

Min-Sheng Chen¹, Chih-Nan Wang¹
¹National Yunlin University of Science & Technology, Taiwan

Two experiments were conducted to examine the aging effect on prospective memory tasks and ongoing tasks. Experiment 1 was conducted to investigate the relationship between event-based prospective memory with different types of prospective cues and memory aid for both younger and older subjects. Experiment 2 was conducted to investigate the relationship between time-based prospective memory with different types of prospective cues and memory aid for younger and older subjects. Various prospective memory tasks and ongoing tasks were manipulated to examine the characteristics of the memory cues and memory aid to the target actions, the nature of the ongoing task, and age differences. The results showed that both performance of EBPM and TBPM was affected by the Memory Aid. The performance of older subjects improved with the use of memory aid compared to those not using memory aids. The performance of EBPM was also affected by memory cues, and a single memory cue was helpful for the older subjects.

Estimating Technical Efficiency for Global E-tailing Companies for Different Regions

Yi-Hsing Lin¹, Chun-Fu Hong²
¹National Quemoy University, Taiwan
²National Yang-Ming University, Taiwan

Only a few attempts have so far been made to examine the technical efficiency of e-tailing companies. This study estimates the technical efficiency in production of e-tailing companies in the American, European and Asian regions under heterogeneous technologies by applying metafrontier analysis to unbalanced panel data for 47 e-tailing companies during the period 2000-2008. The results show that the technical efficiency exhibits partial

discrepancies when both traditional stochastic frontier analysis and metafrontier analysis are used. The average technical efficiency of e-tailing companies in the American region is found to be higher than that in the European region, which is in turn higher than that in the Asian region. However, when using metafrontier analysis, the technical efficiency of the e-tailing companies in the American region is found to be higher than that in the Asian region, which is in turn higher than that in the European region. Thus, we consider it to be a fallacy to suppose that the technical technologies used in the operations of e-tailing companies in the American, European, and Asian regions are identical.

International Liquidity, Inflation and Exchange Rate: Evidence from China

Hongxia Ma¹, Xuefen Sun¹
¹Wuhan University, China

This paper examines the effect of international liquidity and exchange rate on China's inflation through cointegration test and vector error correction model. We build the econometric model on the traditional quantity of money theory, while introducing international liquidity and its transmission channels. Empirical results show that impact of short-term external liquidity on China's inflation is not significant, but long-term external liquidity has a clear negative effect on China's inflation. We also find that after the reform of Renminbi exchange rate regime, this negative effect is strengthened. We should guard against China's inflationary pressure coming from the external liquidity crunch in the post-crisis era and take appropriate monetary measures.

An Empirical Analysis of the Content of Chinese and American B2C Home Furniture Web Sites

Liyi Zhang¹, Shouxiang Li¹, Yun Xiao¹
¹Wuhan University, China

By comparing the content of Chinese and American B2C Home furniture web sites, this paper tries to use the Chi-square test of independence to determine whether there are significant differences between them and take charge of a set of index system to compare the content of these web sites. The data for this study comes from 25 Chinese and 25 American Home furniture web sites. In fact, this paper finds that American web sites prefer to provide specific information related to products and online purchase of products, while Chinese web sites are inclined to provide interactive information, such as virtual community.

Key Factors of Online Bank Brand Choice Intention - Basing on Mainland China Online Banks

Junfeng Liao¹, Rui Cheng², Zhongqiang Wang³
¹South China University of Technology, China
²City University, Hong Kong
³University of Warwick, United Kingdom

This study tries to use the theory of relationship marketing on the banking industry. Based on TAM and commitment - trust model, research and analysis the key factors of online bank brand choice intention. In addition, the study tries to find out the relationship between the user's knowledge and choice when environment changes to online bank. Moreover, the study aims to explore and summarize various factors affecting online bank choice intention, which may be different with traditional bank.

An Agent Based Negotiation Mechanism Considering Suppliers Bidding in an Automated Business Transaction

S. Kamal Chaharsooghi¹, Zahra Taheri¹
¹Tarbiat Modares University, Iran

Agent based negotiation is one of the popular mechanisms of automated negotiation in the world of e-business. An automated negotiation mechanism that is going to be accepted by users should be human inspired. Therefore, there is a growing need to design reliable and effective agent based negotiation mechanisms. In this paper, we propose a dynamic negotiation mechanism which in contrary to other researches, allows buyer to consider overall condition of e-market during negotiation to each supplier. Proposed mechanism enables buyer to decide about counter offers based on the preference of all offers simultaneously. Buyer and supplier agents can experience more flexibility by using this mechanism. We demonstrate the efficiency and feasibility of the

proposed mechanism by evaluating it according to some predefined conditions such as guaranteed success and Pareto optimal solution.

Cloud Computing for Network Business Ecosystem

Roberto Gagliardi¹, Fausto Marcantoni¹, Alberto Polzonetti¹, Barbara Re¹, Pietro Tapanelli¹
¹University of Camerino, Italy

Traditionally, computing infrastructure has been a substantial burden for companies. But what happens when business are unchained from their physical infrastructure and allowed to focus on business goal ? The model of infrastructure as a service and cloud computing bring us closer to this possibility. In this paper we discussed the growth of the web based service industry. The myriad of service now available over the internet rely on data center spread around the world. One of the major new trends in computing the rise of what is known as cloud computing, in which not only service are offered remotely over the internet, but also a full menu of computing resource such a computing power, storage, databases, and many other resources.

An Oligopolistic Electricity Model with Marketable CO2 Emission Permits

William Chung¹
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In this paper, we derive an equilibrium model of the CO2 emission permits market. We consider a variational inequality (VI) approach to model an oligopolistic competition in the market of CO2 emission permits and electric power. A Cournot model of electricity market is described and variational inequality formulations are derived for oligopolistic electricity models with marketable CO2 permits. Solution method and a simple example is presented and implemented in a PC and solved by a built-in solver powered by GAMS.

The Project Management of the Profit Contribution from the Customers of Mobile Virtual Private Network Services

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²Chunghua Telecom Co., Ltd., Taipei, Taiwan and National Dong Hwa University, Taiwan
³National Dong Hwa University, Taiwan

This paper aims to probe into the mobile virtual private network (MVPN) and analyzes the impact of project management on the profit contribution of a case mobile company. An empirical model is constructed based on multiple regressions. The dependent variable is the profit contribution from each of six major corporate customers of MVPN services of the case mobile company; independent variables include the service benefits of MVPN services, whether the preferential price of mobile phone is offered by the case mobile company, the monthly mobile bill discount provided by the case mobile company, and the monthly mobile bill subsidy amount offered by corporations to their employees. The empirical results can establish a core business strategy on customer value proposition and identify the best market segment to enhance the profitability and sustainable growth in order to increase the case mobile company's market competitiveness and business performance.

High in Quantity and High in Storage: A Look Into the Patents Conversion in Chinese Universities

Yang Zhou¹, Jin Chen¹
¹Zhejiang University, China

The total number of patent application and granted in Chinese universities has increased rapidly with only a few valid, which yield a conversion rate close to zero and a terrible waste of resources in recent years. This paper takes analysis of the status of the patent foam and reason for that based on data from the National Intellectual Property Office. And a proposal was given in the final stressing the governmental policies and complementary mechanisms. The cooperation of government, firms and universities was stressed in reducing the patent foam.

Examining Transactive Memory System in R&D Teams

Chi-Cheng Huang¹, Pin-Chen Jiang²

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²*Chang Jung Christian University, Taiwan*

Teamwork has become a preferred method used by organizations to conduct R&D. As the importance of teamwork in R&D increases, additional research is needed to gain insight into what constitutes successful R&D teams. The transactive memory system (TMS) postulates that team members have a shared understanding of which team member knows what. R&D is knowledge-intensive. Thus, R&D members need to develop TMS such that knowledge are effectively communicated and integrated when tasks are performed. This study examines the role of TMS in R&D teams. Our research model utilizes data drawn from a sample of 168 members of 32 R&D teams in Taiwan and is analyzed using the partial least squares (PLS) method. The results of this study indicate: (1) network ties positively affect TMS, (2) TMS positively affects team performance and (3) knowledge integration mediates the relationship between TMS and team performance. This study discusses implications for R&D team management.

A Review of Inter-Firm Technology Transfer Through the Lens of the Resource-Based View

Nisakorn Somsuk¹

¹*Thammasat University, Thailand*

This paper reviews the literature to provide a broad overview of a Resource-Based View of the firm (RBV) in the context of inter-firm technology transfer (ITT). This paper integrates RBV perspective into an ITT process through the link between factors affecting technology transfer performance, organizational learning, and a firm's competitive advantages, which enhances and reinforces understanding of how firms can achieve a sustainable competitive advantage by using firm-specific resources and capabilities. Finally, this paper concludes with contributions and suggestions for future research.

The Interactive Effect of Knowledge Management with Organizational Citizenship Behavior on Knowledge Management Performance in Taiwan Semiconductor Industries

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¹*National Changhua University of Education, Taiwan*

²*Cheng Shiu University, Taiwan*

³*National Chiao Tung University, Taiwan*

This study aims to study the relation between knowledge management and knowledge management performance, in Taiwan semiconductor industry, as well as organizational citizenship behavior being the moderator in the relation. Questionnaires were distributed to R&D personnel of public-listed companies in Taiwan semiconductor industry, and total 470 effective samples were retrieved. For data analysis, the stepwise linear regression analysis was applied to examine the relation among variables as well as the moderating effect. The findings show that in Taiwan semiconductor industry, (1) the higher level of knowledge management is practiced, the more effect on knowledge management performance is received; (2) the higher level of organizational citizenship behavior exists, the more influence on knowledge management performance is believed. We also observed presence of organizational citizenship behavior resulting in positive moderating effect in the relation between knowledge management and knowledge capacity performance, but negative moderating effect in the relation between knowledge management and knowledge flow performance.

University-Industry Technology Transfer Programme's Success Analysis: Using the Analytic Hierarchy Process-Based Model

Nisakorn Somsuk¹

¹*Thammasat University, Thailand*

University-Industry Technology Transfer (UITT) is the transfer of innovations or research results from a university to the industrial and commercial marketplace. UITT can be a source of financial gain for both universities and industries. To promote and enhance the success of a UITT programme, the management team needs to understand the necessary resources and managing operations required for successful implementation, and also needs to prioritize the success drivers for consolidating their efforts on the most important success drivers. Therefore, this paper aims to

determine success drivers with respect to an organization's resources and managing operations in enhancing the success of UITT programme implementation, and to propose an Analytic Hierarchy Process based model to prioritize these success drivers of UITT programme. The paper is grounded in the Resource-Based View of the firm and Operations Management for identifying the success drivers of UITT programme.

Research on Pervasive Knowledge Service Model

Min Yao¹, Xinghe Wu¹, Yao Yao², Yiwen Wang¹

¹*Zhejiang University, China*

²*Hangzhou Normal University, China*

Knowledge service is the integration of knowledge and services. Introducing the concept of "people-oriented" in pervasive computing to knowledge service, this paper constructs a kind of pervasive knowledge service model by means of multidisciplinary research achievements such as intelligence computing, system science, ecology, system science, knowledge science and service science, especially generalized computing and generalized learning proposed by us. At the same time, the key technologies of pervasive knowledge service are discussed.

What Leads to Differences in Success Antecedents? Analyzing the Effect of Offering Nature, Variety, and Service Mode

Bin Xu¹, Kay Chuan Tan¹

¹*National University of Singapore, Singapore*

Service industries have been booming and their specialness is widely discussed. There are suggestions that the developing antecedents would differ between service firms and product firms. However, there are also other means for business categorization, and the antecedents have rarely been studies globally. In this study, framework for future research is proposed based on literature review. The antecedents are grouped as "BASICS": backdrop, atmosphere, supporting system, internal enablers, and customer-related factors. They are suggested to be affected by offering nature, offering variety, and service mode. We also suggested the methods for data collection and analysis. Expectations on the results are also stated.

Theoretical Perspectives in Quality Management Implementation: A Literature Review

Nisakorn Somsuk¹

¹*Thammasat University, Thailand*

The main objectives of this paper are to review the theoretical perspectives in quality management (QM) implementation and to provide direction for fruitful future research. The four primary organizational theories (resource-based view, knowledge-based view, contingency theory, and institutional theory) are reviewed and analyzed as to how these theories support the implementation of QM approaches. The results of this study provide a broad overview of the literature on QM through the lens of the major theoretical perspectives as well as opportunities for future inquiry of theory-based research in QM approaches.

Session	Decision Analysis & Methods (4)
Date	9/12/2010
Time	11:00 - 12:30
Room	NAPLES 2703
Chairs	Mubarak Almutairi; Tomasz Błaszczyk

Dynamic Linguistic Weighted Averaging Operators Applied to Decision Making

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²Dong-A University, South Korea

The dynamic multiple attribute decision making problems with linguistic information are investigated. A new aggregation operator called dynamic linguistic weighted averaging (DLWA) operator is presented. Based on the DLWA and LWAA operators, we develop a procedure to solve the we develop an approach to the dynamic linguistic multiple attribute decision making (DL-MADM) problems where all decision information about values takes the form of linguistic variables collected at different periods. Finally, an illustrative numerical example is also given.

A Comparison of Three Forecasting Methods to Establish a Flexible Pavement Serviceability Index

Ching-Tsung Hung¹, Shih-Huang Chen²

¹Kainan University, Taiwan

²Feng Chia University, Taiwan

Since 1960, the pavement serviceability index has supported the efforts of engineers who make decisions concerning maintenance strategies. The data of pavement surfaces do not belong to a normal distribution. Because the data violate the basic assumptions of linear regression, the pavement serviceability index is not suitable for regression modeling. Many kinds of prediction models with non-statistical foundations have been developed in recent years. To establish a flexible pavement serviceability index, this paper considers a fuzzy regression model, a support vector machine and a genetic programming. Our support vector machine has the highest predictive accuracy of the three methods in this study. The support vector machine uses a hyperplane transform to process interactions among pavement variables

Decision Making in House of Quality: A Hybrid AHP-PROMETHEE Approach

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¹Shomal University, Iran

²Alzahra University, Iran

³Azad University, Iran

This paper discusses the problem of ranking technical requirements (TRs) according to customer needs (CNs), which is arisen from the final stage of the house of quality (HOQ) process. To rank technical requirements in a useful approach, the paper employs an integrated analytic hierarchy process (AHP) and PROMETHEE II approach; AHP is used to determine the relative importance of multicriteria, and PROMETHEE II is applied for final ranking of technical requirements. To analyze the quality and reliability of decision problem, the result of PROMETHEE II evaluation is represented by the geometrical analysis for interactive aid (GAIA) plane. A case study on an automotive part is put forward to illustrate the performance of the proposed methodology.

Restaurant Location Selection by Utilizing the Fuzzy Preference Relations

Tsung-Han Chang¹

¹Kao-Yuan University, Taiwan

Location is a significant factor leads to the success of a restaurant operation and management. This paper utilizes the fuzzy preference relations to select a restaurant location. Pairwise comparisons are conducted to obtain the importance weights of evaluation criteria and the performance rating of alternative locations. By multiplying the importance weights of evaluation criteria and the performance rating, a performance value is determined to rank the alternative locations. Compared with the AHP, the major contributions of this proposed framework are: 1) it just takes $n-1$ comparisons rather than $n(n-1)/2$ comparisons to obtain a complete decision matrix which has n elements; 2) the inconsistency is not occurred in this process because of additive reciprocity transitivity.

Is China's Voluntary Action on Carbon Intensity Cut Too Ambitious?

Hongliang Yang¹, Dan Shi²

¹Asian Development Bank, Philippines

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Carbon intensity (CO₂/GDP), as an indicator, is easy to understand and use, but has serious limitations. In most countries, most CO₂ emissions come from consumption of fossil energy. Energy alone cannot produce any output, and it must be combined with other factors, such as capital and labor, in production. Therefore, an economy's resource endowments will inevitably influence its energy consumption and also CO₂ emissions. For example, energy intensity may increase solely because energy is substituting for labor, rather than any underlying deterioration in emitting technology. This can happen in any modernization process of any economy. This paper therefore suggests we consider an economy's carbon performance from a total factor perspective. Based on the lessons learned from efficiency analysis literature, a Data Envelopment Analysis (DEA) -based total factor model is proposed. An empirical study was conducted using provincial-level data from China in 2005. Results suggest that China's voluntary carbon emissions reduction target of 40%-45% by 2020 may be harder than expected to achieve.

Fuzzy Approaches to Two-Decision-Maker Games

Mubarak Almutairi¹

¹Hafr Albatin Community College, Saudi Arabia

A unique fuzzy approach is developed to model uncertainties in the preferences of a decision maker involved in a conflict. Human judgments, including expressing preferences over a set of feasible outcomes or states in a conflict, are usually imprecise. Situations characterized by vagueness, impreciseness, incompleteness and ambiguity, are often reflected in the decision maker's preferences. When modeling a conflict, it is assumed that the decision makers, the courses of actions available for each, and the preferences of each decision maker are known. When the preferences of the decision maker over a certain set of actions are not known with certainty, this could affect the overall equilibria which are predicted in an analysis. Hence, fuzzy logic is used to handle imprecise or vague preference information so that realistic equilibria can be found. The well-known game of Prisoner's Dilemma, in which one must decide whether or not to cooperate, is employed as an illustrative application to demonstrate how the fuzzy preference methodology works in practice.

Session	Decision Analysis & Methods (5)
Date	9/12/2010
Time	13:30 - 15:00
Room	NAPLES 2703
Chairs	Chih Wang; Majid Jalili

An Evaluation Methodology for Binary Pattern Classification Systems

Chih-Fong Tsai¹

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Evaluation of pattern classification systems is the critical and important step in order to understand the system's performance over a chosen testing dataset. In general, considering cross validation can produce the 'optimal' or 'objective' classification result. As some ground-truth dataset(s) are usually used for simulating the system's classification performance, this may be somehow difficult to judge the system, which can provide similar performances for future unknown events. That is, when the system facing the real world cases are unlikely to provide as similar classification performances as the simulation results. This paper presents an ARS evaluation framework for binary pattern classification systems to solve the limitation of using the ground-truth dataset during system simulation. It is based on accuracy, reliability, and stability testing strategies. The experimental results based on the bankruptcy prediction case show that the proposed evaluation framework can solve the limitation of using some chosen testing set and allow us to understand more about the system's classification performances.

On the Use of Multi-criteria Decision Aid Tools for the Efficient Design of 3D-stacked Integrated Circuits: A Preliminary Study

Anh Vu Doan¹, Yves De Smet¹, F. Robert¹, Dragomic Milojevic¹

¹Université Libre de Bruxelles, Belgium

In past decades, the electronic industry has been following the Moore's law to improve the performance of CMOS integrated circuits (IC). However, it will probably be impossible to follow this law in the future due to the quantum effects appearing with the miniaturization of the transistors below a certain threshold. In order to overcome this problem, new technologies have emerged, and among them the 3D-Stacked Integrated Circuits (3D-SIC) have been proposed to keep the Moore's momentum alive. 3D-SICs can bring numerous advantages in the design of future ICs but at the cost of design complexity due to their highly combinatorial nature and requiring optimization of several conflicting criteria. In this paper, we present a first approach in development of tools that can help the design of 3D-SICs, using multi-criteria analysis. Our study has targeted one of the main issues in the design of 3D-SICs: the floorplanning. This work has shown that the use of Multi-Criteria Decision Aid (MCDA) tools can provide relevant and objective analysis of the problem that may not be feasible with the current design methods. We believe that these promising results will allow designers to overcome the complexity of designing 3D-SICs.

Investigation on the Improvement of Operational Performance of Soeu's in India Using Dea Based Malmquist Index

Meenakumari Ramachandran¹, R Subasri¹, S Jayamani², N Kamaraj³

¹Kongu Engineering College, India

²Pavai Engineering College, India

³Thiagarajar College of Engineering, India

This paper investigates the improvement in the operational performance of 29 state owned electric utilities in India on region wise, using Data Envelopment Analysis based (DEA) Malmquist Productivity Index (MPI) for the two year period i.e., 2003-04 and 2005-06. Two different models viz., the CCR DEA model and the BCC DEA model are applied to evaluate the performance. DEA based Malmquist Productivity Index (MPI) is decomposed as technical efficiency change and technology change to witness the growth of the SEOU's. The result of these measures shows the impact of various parameters for the change with regard to technical efficiency and technology.

A Note to TOPSIS Method in MADM Problems Under Fuzzy Environment

Zhi Pei¹, Li Zheng¹

¹Tsinghua University, China

TOPSIS method has been widely used to solve various multiple attribute decision making and multiple criteria decision making problems since Hwang and Yoon first introduced it in 1981. The

ranking results of TOPSIS are proved to be relatively convincing in many practical areas. However, in recent research we find that the traditional fuzzy TOPSIS method could not distinguish all of the alternatives in some circumstances. As stated later in this paper, several counter examples in triangular fuzzy number format will be demonstrated, where the fuzzy TOPSIS method fails to give alternatives respective rankings. And the reason for that phenomenon will be further discussed. Then a revised procedure is suggested in order to fully differentiate all of the alternatives. Finally a numerical example is given so as to testify the revised procedure.

Characterizing Triggers of Reactive Cycles within Design Processes Based on Process Observation

Arne Herberg¹, Stefan Langer¹, Florian Netter¹, Udo Lindemann¹

¹Technische Universität München, Germany

The high degree of uncertainty and complexity of Simultaneous Engineering processes lead to the persistent occurrence of unforeseen situations constituting the deviation (Δ) of product or process properties (IS-state) from an initially established or assumed value (TO-BE-state). The consequence of the identification of these Δ s often is the necessity of the (partial) repetition of activities or phases, being defined as reactive cycles in this research context. The understanding of reactive cycles and especially the described Δ s as one central class of their triggers are aimed at through the real-time observation of a mechatronic development project with regard to occurring problems during process execution. The classification of those triggers and the acquisition of quantitative correlations with further aspects of the analyzed cycles constitute an important contribution with regard to the long-term goal of a holistic cycle management.

Utilization of Data Mining on Asset Management of Freeway Flexible Pavement

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²Feng Chia University, Taiwan

³Taiwan Area National Freeway Bureau, Taiwan

Data mining is used to analysis a large number of data. The study was using asset management of freeway flexible pavement and re-dug out new knowledge of pavement cracks by using decision tree of data mining. Road units were built per 20 meters per lane. Construction data (35,828 documents) was built and included road construction type, altitude and topography. Maintenance constructions data (36,439 documents) was built. The historical data included equivalent single axle loads, temperature and rainfall. Decision tree of C5.0 and C&R tree are different from the principle of calculation. The result of C5.0 was 92 rules and accuracy rate was 95%. The result of C&R tree was 21 rules and the accuracy rate was 80%. The results by C5.0 could be used to distinguish the reasons of pavement crack, and the results of C&R tree could be used to forecast the types of pavement crack.

Building Fuzzy Random Objective Function for Interval Fuzzy Goal Programming

Arbaity Nureize¹, Junzo Watada¹

¹Waseda University, Japan

Estimating the coefficients of objective functions in multi-objective model is sometimes difficult in real situations. Mathematical analysis of statistical data is used to determine the coefficients. In various cases, the statistical data may not contain only randomness, but also fuzziness, which should be treated properly. Thus, this paper employs fuzzy random regression model to approximate the coefficients values for objective functions of multi-objective model. The presented model consists of two stages; first, developing the objective functions by fuzzy random regression model and second, introducing an interval fuzzy goal programming model to solve the multi-objective problem. An experimental example is provided to illustrate the model.

Session	Decision Analysis & Methods (6)
Date	9/12/2010
Time	15:30 - 17:15
Room	NAPLES 2703
Chairs	Majid Behzadian; Xuenzheng Zhang

A Cost and Space Efficient Method for Unbalanced Assignment Problems

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²Sirindhorn International Institute of Technology, Thailand

In this paper, a new cost and space efficient solution to unbalanced assignment problems is presented. The new solution uses linear space complexity instead of polynomial complexity as used by the Hungarian method. Moreover, its optimal cost is lower than of the Kumar method - an existing linear space complexity solution to unbalanced assignment problems.

The Effects of Feature Selection and Model Selection on the Correctness of Classification

ShuChuan Lo¹

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In this research we took an experiment of two feature selection methods--eta square and stepwise methods on two classification models--back propagation neural network (BPNN) and general regression neural network (GRNN) to study the effects on the correctness of firm bankruptcy classification. The correctness includes the average classification correctness and the power of bankruptcy classification which is the probability we conclude failure if firms are in crisis. The data sampled from the listed electronic companies in Taiwan's market from 1999 to 2006. The experimental reports showed that feature selection has more influences on average correctness and power than model selection. Overall, the stepwise method has the highest correctness among these four combinations which are the two feature selections and two model selections but the two models BRNN and GRNN has not much difference in our experiment.

A Case Study of Evaluating Supplier's Selection Criteria in a Steel Bars Manufacturer

Yun-Ning Liu¹

¹University of Dong Hua, Taiwan

The supplier selection is a multi-criterion problem which includes both qualitative and quantitative criteria. In order to select the best suppliers it is necessary to make a trade off between these tangible and intangible criteria some of which may conflict. This study examines the difference between a president' rating of the perceived importance of different supplier attributes and their actual choice of suppliers in an experimental setting. We use the normalization: an interview scale set of questions, to determine the importance of supplier attributes; and makes sure all criteria have the same range, to examine the choice of suppliers. The results indicate that although the president says that price is the most important attribute for a supplier, they actually choose suppliers based largely on financial and delivery.

A Study on Revenue Management of Taiwan High Speed Railway

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²G5 Capital Management, Ltd., Taiwan

This study applies yield management to calculate the optimum rate and discriminate price rates for Taiwan High Speed Railway to maximize the revenue. The conclusions are: 1. The north bound train prices have higher elasticity than the south bound train, which could be taken advantages to increase the revenue. 2. Based on the price discriminations, there could be 3.37%-6.59% revenue increase potential. 3. Adopting the reservation data to adjust the prices and allocation of the unreserved seats, we can find the optimum ratio and price.

A Fuzzy Logic-Based Evaluation Method for Idea Screening of Product Design

Yao-Tsung Ko¹, Ping-Hong Kuo¹

¹Tunghai University, Taiwan

The idea screening of a new product concept is perhaps the most critical activity in new product development (NPD). This paper presents a fuzzy synthetic evaluation method (FSEM) for selecting an optimum design alternatives based on fuzzy set theory. The process involves constructing a hierarchical objective, setting evaluation criteria, establishing a fuzzy judgment matrix and weight vector, and then ranking the order of design alternatives by a fuzzy number in the fuzzy sequencing vector. A hierarchical structure is used to calculate the fuzzy probability level by level from the lowest-level objectives. The proposed approach can efficiently aid managers in dealing with both ambiguity and complexity in product screening decisions. To verify the feasibility of this approach, a case study is conducted with a product design of Power Line Communication (PLC) in this study.

Predictive Modeling of High-Performance Concrete with Regression Analysis

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²University of Texas at San Antonio, United States

High-performance concrete (HPC) is a very complex material and hence very hard to predict its compressive strength. This paper deals with building a regression model for predicting concrete's compressive strength. First of all, eight process variables are identified as determinants of Concrete Compressive Strength (CCS). These variables are Cement, Blast Furnace Slag, Fly Ash, Water, Superplasticizer, Coarse Aggregate, Fine Aggregate, and Age. Further, correlation among these variables is computed and it is found that a few of them are highly correlated. Therefore, interactions among these variables are taken into account. After that, a regression model is developed by regressing CCS against all process variables and significant interactions. Finally, to fine tune the model diagnostics are conducted and a parsimonious model is obtained with 84.37% coefficient of determination. Appropriateness of the model is investigated by testing it against unseen data points.

Regional Industrial Energy Efficiency Research Under the Low-carbon Economy Target

Yuanying Chi¹, Yuanqin Chi², Dongxiao Niu¹, Zhi Liu¹

¹North China Electric Power University, China

²Longkou Liangjia Coal Mine, China

In current, we must improve the energy efficiency and optimize the structure of energy in order to realize the "low-carbon economy". The paper just uses LINDO software and DEA method, studies the efficiency problems among the industrial energy, environment input and economy output in each province in china .The result shows that industrial efficiency need to be improved in many provinces except Shanghai and Guangdong which are in high efficient. From the view of regional distribution, the industrial efficiency of eastern provinces is higher than central and western provinces', which was caused by the difference of technical progress and industrial structure.

Session	Technology & Knowledge Management (4)
Date	9/12/2010
Time	11:00 - 12:30
Room	NAPLES 2603
Chairs	Uchenna Cyril Eze; Yuva Kajikawa

Developing Coherency Matrix to Support Design Changes of Complex Product

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In many business fields, customers have become very demanding to the point that they only ask for individualized products and services. These changes at the customer's level have forced companies to react by developing new operations strategies in order to secure market shares and improve profits. New products (customized product) are often designed change or modification to existing product. Design by modification applies particularly to safety critical product where the reuse of existing working parts and subsystems can reduce cost and risk. However change is rarely a matter of just reusing or modifying parts. Changing one part can propagate through the entire design leading to costly rework of the whole product. This paper introduces tools to aid designers in understanding the potential effects of change based on studies of industrial complex product. The coherency matrix has been developed to model the integration and visualization of change propagation through system connectivity.

Determinants of Knowledge Search Strategy of Chinese SMEs

Fang Luo¹

¹*Zhejiang University, China*

As a major producer of products and services in global markets, China is building up innovation capabilities. Chinese small-and-medium enterprises' innovation depends not only on the internal R&D, but also on searching more and more outside knowledge.

In this study, we investigate which factors may influence the knowledge search strategy. Those factors include competitive strategy, resources and environment.

Based on the survey of IDRC, the results show that (1) cost leadership strategy may lead to more knowledge search than differentiation strategy in Chinese SMEs; (2) cost leadership strategy, absorptive capacity, environmental uncertainty and organizational change have the positive influence on the search depth; (3) resource slack has an inverse U-shape effect on search breadth; and (4) the relationship between competitive strategy and search depth is negative moderated by the environmental uncertainty. Specifically, firms' size and export ratio have no significant influence on knowledge search strategy.

Performance Assessment of Technology Transfer Project: An Application of DEA Technique

Prattana Punnakitikashem¹, Patarapong Intarakumnerd², Tritos Laosirihongthong²

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Technology transfer is a mechanism to acquire technology and helps company to enhance their technology capabilities. The purpose of this study is to demonstrate how Data Envelopment Analysis (DEA) can be used to assess performance of technology transfer project at firm level. Data collected from transferring the robotics operating technology project of 12 automotive parts/components manufacturing companies are examined by using the DEA model. The results of this study show that six companies carried out efficient technology transferring. The average efficiency score of technology transfer project is 93.3%. This finding confirms that absorptive capacity of recipient firms is a critical success factor underlying differences between efficient and inefficient firms. DEA method provides Chief Technology Officers (CTO) or project leaders a framework to determine appropriate transferring mechanisms and necessary internal and external resources.

Determining Enabling Factors of University Technology Business Incubation Program: Resource-Based View Theory

Nisakorn Somsuk¹, Prattana Punnakitikashem², Tritos Laosirihongthong¹

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University Technology Business Incubation (UTBI) is a program developed for an entrepreneurial company by providing a variety of resources and services to a selected start-up or entrepreneurial groups in early-stage technology-related ventures. To promote the success of UTBI program, it is important for management team to understand the necessary resources required by the program. The purpose of this paper is to determine enabling factors with respect to company resources in enhancing the success of UTBI. Resource-Based View (RBV) theory was considered as a grounded theory to develop those enabling factors. After reviewing literature on UTBIs and RBV theory, four categories of resources were identified. These are human, technological, financial, and organizational resources. Then, the attributes representing each category were assigned using the Q-sort technique. Finally, the model of analytical hierarchy decision making process is proposed to examine the relative importance of each resource to the success of UTBI program. Panel of experts will be carried out in the next stage of this research project.

A Conceptual Framework of Cluster Innovation Mechanism Based on Network Theory: A Case of Dalian Software Park in China

Weilin Zhao¹

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Industry clusters, which encompass a series of interconnected firms or heterogeneous firms in designated geographic concentrations, show competitive advantages for industrial development with substantial resources from the encouraged networks among firms, and then lead to the development of cluster innovation by information sharing and effective knowledge/technology transfer. In a word, the clustering effects generated from the formation of industry cluster and networks among the firms are well displayed and utilized. With a case study of Dalian Software Park (DLSP) in China and based on the viewpoints of networks, this paper attempts to provide a feasible framework to elucidate the innovation mechanism of industry clusters and to give more suggestive implications for the success of industry cluster, industrial development and economic growth.

Building Environmental Assessment as a Knowledge Management Tool Driving Society

Yuva Kajikawa¹, Toshihiro Inoue¹

¹*The University of Tokyo, Japan*

Green construction is gaining an increasing attention in the global context. However, green involves different meanings and different perspectives. Therefore, it is not a rudimentary task to manage green housing and green building project. Utilization of building environmental assessment tools has some benefits to achieve the projects. In this paper, we discuss the benefits and limitations of such an approach. Comprehensiveness, design guideline, signaling, and communication are indicated as major benefits of it, while we have remaining issues including mixture of quantitative and qualitative measures, ambiguity of weighing, and lack of financial aspects.

Session	Technology & Knowledge Management (5)
Date	9/12/2010
Time	13:30 - 15:00
Room	NAPLES 2603
Chairs	Tritos Laosirihongthong; Dotun Adebajo

Technological Regime and Knowledge Productivity: An Industry-level Analysis of Chinese Manufacturing

Bin Guo¹, Xiaoling Chen¹
¹Zhejiang University, China

Based on the knowledge production function framework, this article uses industry-level data of Chinese large and medium-size manufacturing enterprises over the period of 1996-2001 to explore the influences of technological regime on efficiency of knowledge production, as well as the potential complementary or crowded-out effects of technology transfer and inter-industry R&D spillover upon in-house R&D in knowledge creation. The empirical results reveal that for efficiency in knowledge production, scale economies, speed of obsolescence of knowledge, and accessibility of external knowledge in foreign technology transfer have positive contributions. But the relative reliance on inter-industry R&D spillover shows negative impact on knowledge productivity. Finally, this article provides an explanation based on the threshold effect of in-house R&D to the issue why the literature concerning complementary or substitution effect between foreign technology transfer and indigenous R&D lead to a mixed result in the context of developing countries.

Missing Link Between Knowledge Management and Organizational Performance---Empirical Evidence in Taiwan

Chi-Chuan Wu¹, Shu-Hsien Liao², Wen-Jung Chang², Retno Widowati², Da-Chian Hu²
¹Tatung University, Taiwan
²Tamkang University, Taiwan

Many study concern that knowledge management (KM) and organizational performance are essential of the success in business. And there are many different results in literatures which declare KM affects organizational performance positively and negatively. We believe that there are still some confusing relations between KM and organizational performance. Accordingly, we propose some hypotheses to verify relationships among them. Base on a sample of Taiwan knowledge-intensive firms engaged in manufacturing, and financial sectors, data are collected using a mail survey, and hypotheses are tested using structural equation modeling. This paper finds organizational learning (OL) as a coordinating mechanism, like black box. Empirical evidence also supports the perspective that KM affects organizational performance through OL. This paper is one of the empirical supports for the role of OL as a mediator between KM and organizational performance. Therefore, the positioning of OL as a mediator is also an important contribution to our thinking.

A Novel Technique for Measuring the Technology Application on CNG Industry of Pakistan

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¹National University of Sciences and Technology, Pakistan
²Center for Advance Studies in Engineering, Pakistan

This paper proposes a new model for Technology & Automation Evaluation of an industry. The method involves measuring the effect of different technology elements on various dimensions of an industry. As proof-of-concept, the Technology Ratio of a sample (Tesla Industries) has been calculated using this method. It has been found that this technique may be applied to analyze the Technology application of any industry, thus indicating the areas that may be automated to improve performance and efficiency.

Global Trends and Rapid Growth of East Asia in IEEE Publications

Nobuyuki Shirakawa¹, Minoru Nomura¹, Kumi Okuwada¹, Takao Furukawa¹
¹National Institute of Science and Technology Policy, Japan

We organized a database of IEEE Periodicals from a period of over 15 years for quantitative and collective analysis. We found that the IEEE experienced globalization and more active international competition. East Asian countries and regions have grown dramatically and become major players in the IEEE during globalization over the last decade, and: 1) East Asia surpassed North America in research related to electrical and electronics fields; 2) China has the most balanced and rapidly increasing number of articles in all fields; 3) Taiwan specializes in circuits, systems, and electronic devices; 4) South Korea specializes in consumer electronics, broadcasting, and communications; and 5) Singapore owes much to the existence of two research universities.

Leveraging Knowledge Management with the Balanced Scorecard

Maria do Rosário Cabrita¹, Virgilio Cruz-Machado¹, Antonio Grilo¹
¹Universidade Nova de Lisboa, Portugal

In a rapidly changing environment, innovative firms are increasingly using the Balanced Scorecard (BSC) to identify and communicate key factors that drive future value. Knowledge is described as the only meaningful resource in the Knowledge Economy (KE). Although there is recognition that knowledge is a key business asset, many organizations still do not understand the implications of Knowledge Management (KM). The key is to understand what makes knowledge valuable and, in particular, how knowledge creates wealth in a knowledge-driven economy. KM deals with the production, application, and distribution of knowledge within and between organizations. Such intellectual assets are always constituted through practices and undertakings in an everyday work life setting. This paper seeks to examine how the BSC represents a relevant tool to KM, bridging the gap between strategic objectives set at the senior level within an organization and their operational execution.

An Approach to New Product Development Management in SMEs

Bingwen Yan¹
¹Cape Peninsula University of Technology, South Africa

In current dynamic manufacturing environment, Small, Medium Enterprises (SMEs) must develop new products successfully in order to maintain a competitive advantage. SMEs differ from large companies due to their limited resources. Currently, most of SMEs lack a structured process in their New Product Development (NPD) management. NPD is vital for SMEs to survive in a competitive business environment. Data collected through interviews and survey questionnaires from 40 SMEs in the Western Cape Province, South Africa suggest that SMEs need a more structured NPD model which consists of critical elements such as management commitment, employee involvement, product strategy, new product quality, customer satisfaction, and feedback of new product launching.

Session	Technology & Knowledge Management (6)
Date	9/12/2010
Time	15:30 - 17:15
Room	NAPLES 2603
Chairs	Uchenna Cyril Eze; Hongyi Sun

Fuzzy Axiomatic Design for Knowledge Demanders and Suppliers in Knowledge Service

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³*Northeastern University, China*

In order to find the appropriate matching pairs between knowledge demanders and knowledge suppliers, this paper researches the matching problem in knowledge service. Based on the expectation level information of demanders and the actual level information of suppliers, it is an important research topic to match the two sides in multi-attribute trade. Considering the multi-attribute matching design problem in knowledge service, it gives the description of multi-attribute trade matching problem between demanders and suppliers. In order to solve the problem, a calculation method of multi-attribute matching degree based on axiomatic design is proposed to analyze the matching degree between demanders and suppliers. Then, a multi-objective optimization model is constructed to solve the matching problem in knowledge service. The model is transformed to a single objective model by the method of weighted sums based on membership function. By solving the model, the trade matching results can be obtained. Finally, an illustrating example is given to show the feasibility and practicability of the proposed approach.

Information Technology Acceptance Models Comparison and IT Development Strategies: In Small and Medium Sized Enterprises Case

Masoud Movahedi¹, Mostafa Zamanian², Amirhossein Meisami³

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²*Amid Development Management Consultants, Iran*

³*K. N. Toosi University of Technology, Iran*

Numerous studies conducted on the information technology (IT) acceptance specifically in developing and less-developed countries indicates the importance of acceptance as a substantial stage in the process of IT implementation. Perceiving problems, opportunities, threats and fundamentals makes this process more convenient. Considering numerous researches in the field of IT acceptance, this study provides essential classification on models of the effective acceptance factors, besides presenting critical concepts of acceptance through IT literature. Additionally, categorized models were tested in Iranian insurers and brokers in order to compare their effectiveness and the results confirmed the necessity of considering non-technical factors as well. At the end, the approaches employed within acceptance process were classified into long, mid and short-term strategies.

A Framework for Measuring Performance Faculty Knowledge Management Program

Amelia Kurniawati¹, Luciana Andrawina¹

¹*Telecom Institute of Technology, Indonesia*

This research is proposed to explore and develop indicators from the framework of knowledge management measurement in a faculty of a university. The concept to measure organizational knowledge sharing capability and business value consists of four dimensions. The first dimension, cognitive dimension, consists of share language and share narratives. The second dimension, codified knowledge dimension, consists of formal knowledge and know how. The third dimension, culture dimension, consists of knowledge contributing and knowledge transferring. The last dimension, network ties dimension, consists of direct and indirect communication.

An Evidential Reasoning Based LSA Approach to Document Classification for Knowledge Acquisition

Rozlini Mohamed¹, Junzo Watada¹

¹*Waseda University, Japan*

Web is one of major information sources. Failure in proper management of knowledge leads to incorrect results returned by search engines. Therefore, the web should have an effective information retrieval system to improve the correctness of retrieval results. This study provides a method to assign a new document to

the fittest category out of predefined categories, where latent semantic analysis (LSA) is used to evaluate each term in documents, the similarity between terms and documents as well as the one between terms and categories. The objective of our method is to fuse evidential reasoning method with LSA which can assign a new document to a predefined category. The method provides better results in performance of classification comparing to the fusion of an evidential reasoning approach with term frequency inverse document frequency (TFIDF).

Requirements Uncertainty and Standardization in IS Development Projects: A Survey of the IT Sector in China

Younes Benslimane¹, Zijiang Yang¹, Bouchaib Bahli²

¹*York University, Canada*

²*Danube University, Austria*

This paper examines the issue of requirements uncertainty in information systems (IS) development projects in China. It focuses on key dimensions of IS requirements uncertainty, their effect on project performance and on the role of typical frameworks used to standardize IS development processes. Findings from a survey of 82 senior information technology (IT) professionals show that (i) instability and diversity of IS requirements are the most problematic dimensions of requirements uncertainty, (ii) requirements uncertainty affects the performance of IS development projects and (iii) standardization can reduce that uncertainty and improve the performance of IT projects. The implications for research and practice are discussed.

Knowledge Long Tail

I-Ching Lin¹, Rainer Seidel¹, David Howell¹, David Walker¹

¹*The University of Auckland, New Zealand*

This paper proposes an approach to visualize the benefits of applying contemporary technology in explicit knowledge management processes. The 'Knowledge Long Tail' is a novel way of categorizing individual and organizational knowledge, and of modeling knowledge in organizations in terms of its type and frequency of use. The concept is inspired by the market long tail phenomenon raised by Chris Anderson. Based on theoretical considerations, it is proposed that by using the three 'long tail technology drivers' to integrate individual knowledge into an organizational knowledge management system, individual and organizational knowledge can be utilized in a more efficient and effective manner.

Knowledge Sharing and Total Quality Management: A Conceptual Framework

Jamie Li-Yi Chua¹, Uchenna Eze¹, Gerald Guan Gan Goh¹

¹*Multimedia University, Malaysia*

This paper examines factors that influence knowledge sharing and the role of knowledge sharing on Total Quality Management (TQM). Knowledge is recognized as a key element in production processes that enhances the capacity of companies to be more responsive to customers' want. Prior works on knowledge sharing have focused on the service industry. This paper is one of the rare attempts to highlight the significance of knowledge sharing in developing functional manufacturing processes. We will develop a detailed literature on knowledge sharing including the conceptual development and the underpinning theory. We will apply a multi-method approach for data collection from a sample for about 1200 companies. Descriptive and Inferential analysis will be conducted to summarize and interpret the relationships between the variables, respectively. We expect the research findings to be useful to manufacturing companies in identifying essentials of knowledge sharing among employees. Consequently, we hope that effective knowledge sharing capacity in the companies would enable improved work processes and better manufacturing practices. Hence efficient TQM and implications for lean manufacturing.

Session	Supply Chain Management (4)
Date	9/12/2010
Time	11:00 - 12:30
Room	NAPLES 2702
Chairs	Kamrul Ahsan; Mahdi Bashiri

An EPQ Model Under Partial Trade Credit Financing with Credit Sensitive Demand

Chandra K Jaggi¹

¹University of Delhi, India

Trade credit is an increasingly important payment behavior in real business transactions. In practice, the supplier allows a certain fixed credit period to settle the account for stimulating retailer's demand. From the retailer's viewpoint, during the credit period before payment must be made, he/she can sell the items and continue to accumulate revenue and earn interest. The main purpose of the present paper is to explore the impact of credit period on the retailer's demand, which may be instant or delayed. An EPQ (Economic Production Quantity) model under the condition of two echelon trade credit with credit sensitive demand has been analyzed. The optimal credit period offered by the retailer and the optimal replenishment time has been jointly evaluated in order to maximize retailer's profit.

A Novel Swarm Optimization Technique for Partner Selection in Virtual Enterprise

Mohapatra S S¹, S. Sahu², Saurav Datta¹, Prasanna K¹, Nihar Ranjan Nayak¹

¹National Institute of Technology, India

²Indian Institute of Technology, Kharagpur, India

Partner selection is a critical issue in formation of virtual enterprises and increasing its operational effectiveness. Such a problem belongs to combinatorial optimization category and known as NP-hard problem. Usually, evolutionary methods are being adopted to obtain near-optimal solutions. In this paper, a variant of swarm optimization is proposed to handle combinatorial problems efficiently compared to its continuous counterpart. The method substantially reduces the number of tuning parameters in the algorithm. The algorithm presented include main crucial factors for partner selection such as the running cost, reaction time and running risk and select the partners for various processes that minimizes total cost. The working of the algorithm is demonstrated with the help of a typical example. Exhaustive simulation illustrates the effectiveness of algorithm.

Understanding Trends of Car Recalls

Kamrul Ahsan¹

¹Auckland University of Technology, New Zealand

This research conducts an empirical study on car recalls in the US market. The research uses secondary data from recall websites maintained by public and private organizations. The objectives of the study are to investigate car recall trends and identify the causes and effects of recalls. Analysis shows that the majority of car recalls are initiated by a few car makers that are facing an increase in recalls and customer complaints. There exists a significant influence of customer complaints on car recalls. Furthermore, the latest car models seem to have less customer complaints compared to older models, and they also have less recalls compared to the older models. The research examines Toyota's case of recent recalls and identified some immediate impacts of recalls on sales and on market share. This research can be further extended to identify key causes of car recalls and the impact on business performance.

Distribution Planning in Supply Chain Management

Radha Ramanan Thiagarajan¹, K Ratnakumar¹, Abhijith Vasudevan¹, Mishaal Sarawgi¹, Mithun Sundar Raj¹

¹National Institute of Technology Calicut, India

The work involves developing a simulation model and a heuristic for a distribution problem with fixed charge in a two stage supply chain. The work is extended to include an integrated supply chain management taking into account both the capacity constrained production environment and two stage transportation distribution. In the first phase the project aims at optimizing the transportation distribution problem using genetic algorithm. In the second phase, a Combinatorial Search Algorithm (CSA) is used for finding the optimum total cost of distribution. The results that are obtained

using CSA are compared with the results obtained using GA. Sensitivity Analysis is carried out to observe the variation in distribution and the total cost as a function of fixed cost, variable cost and demand. After the optimization of the distribution problem, the optimization of supply at the plants concerned is undertaken, wherein which significant improvement in total cost is achieved by relaxing the fixed-supply constraint existent in the original problem.

A Novel Rewards-based Protocol and Decision-making Technique for Transshipment in Supply Chains

Lokendra Shastri¹, Srinivas Narasimhamurthy¹, Durga Prasad Muni¹

¹Infosys Technologies Limited, India

We propose a novel rewards based protocol and online decision-making technique to transshipment between stocking locations each supplied periodically to replenish their stocks. Our approach enables independent decision-making by the stocking locations while each of them can adopt replenishment strategies as they wish. The relevant trade-off in our context is that of a significant reduction in the shortage costs for a smaller investment in transport costs. We conduct a multiperiod simulation study where in each period transshipment decisions are followed by demand occurrence followed by demand satisfaction.

Reverse Logistics Network: A Review

Zheng Wang¹, Hua Bai¹

¹Jinan University, China

As the fundamental and strategic issue in reverse logistics, reverse logistics network has become one of the academic research focuses. This paper gives a literature review on reverse logistics network researches in the last decade, and summarizes the research output of two major methodologies: case study and quantity model. This paper further classifies the numerous reverse logistic network models as closed-loop model, generic model, stochastic model and 3PLs model. This comprehensive review may help identify the future research opportunities.

Solving the Pickup and Delivery Problem in Semiconductor Supply Chain

Chun-Mei Lai¹, Cheng-Che Chen¹

¹Far East University, Taiwan

Taiwan's semiconductor supply chain has been constructed comprehensive and the performance of this industry is very significant. With the comprehensive supply chain, transportation and distribution activities emerge as one of the central issues owing to their complexity and costs. Since the pickup and delivery problem in semiconductor supply chain (PDP-SSC) involves constraints on pickup and delivery, product/vehicle compatibility, multiple-priority, and vehicle capacity constraints, it is more difficult to solve than the classical pickup and delivery problem. In this study, we consider the PDP-SSC and formulate the PDP-SSC as an integer programming program to minimize total traverse time. An example is used to illustrate the performance of the proposed formulation.

Session	Supply Chain Management (5)
Date	9/12/2010
Time	13:30 - 15:00
Room	NAPLES 2702
Chairs	Suk-Chul Rim; Assed Haddad

Analysis of Value Chain Coordination via Revenue-Sharing for Improving the Expected Profits

Yuhei Koike¹, Masato Kotani¹, Ushio Sumita¹, Yoshitugu Yamamoto¹

¹University of Tsukuba, Japan

Recently, the value chain coordination has been drawing much attention of both researchers and practitioners. One of the most prevalent approaches would be "revenue-sharing", where a supplier providing products to a retailer works together with the retailer, and the two parties agree upon a contract so as to increase their respective profits. More specifically, the wholesale price of the supplier to the retailer is reduced to w , and in exchange, the retailer would return the $(1 - \theta)$ portion of its revenue to the supplier. The purpose of this paper is to analyze this revenue-sharing scheme by exploring the $(\theta - w)$ plane and the order quantity Q for improving the expected profits of both the supplier and the retailer. In particular, the region of (θ, w) is identified explicitly, in which the improvement for both would be assured. Furthermore, several new scenarios are proposed, along which the two parties may reach agreement comfortably.

Using Hybrid Metaheuristic Approaches to Solve Bi-Level Linear Programming Problem for Supply Chain Management

R. J. Kuo¹, Y. S. Han²

¹National Taiwan University of Science and Technology, Taiwan

²National Taipei University of Technology, Taiwan

Bi-level linear programming is a technique for modeling decentralized decision. It consists of the upper level and lower level objectives. Thus, this paper intends to apply bi-level linear programming to supply chain management and develops an efficient method based on hybrid of genetic algorithm and particle swarm optimization. The performance of the proposed method is ascertained by comparing the results with other metaheuristic approaches.

A Multi-Product Capacitated Inventory-Location Model with Risk Pooling

Noura Al Dhaheri¹, Ali Diabat¹

¹MASDAR Institute, United Arab Emirates

In this paper, a novel formulation for the capacitated warehouse inventory-location model with risk pooling for multiple products is proposed. A single plant ships different types of products to retailers via a network of warehouses. The locations and inventory policies of the warehouses are chosen so as to minimize the sum of fixed facility location, transportation, and inventory carrying costs. The warehouses retain safety stock so as to maintain appropriate service levels in the face of uncertain demand at the retailers for multiple products.

Bees Algorithm for Dynamic Multi-Zone Dispatching in Truck Load Trucking

Pairush Triwate¹, Pongchanun Luangpaiboon¹

¹Thammasat University, Thailand

An alternative way for increasing the efficiency of transportation management system is to use dynamic multi-zone dispatching. This problem concentrates on the quantities of inbound and outbound in each area and it is modified from the multi-zone dispatching. The factors of the rearrangement penalty of the area, in each zone, including time periods are also included. The objective of this research is to manage zones with minimal imbalance scenario via an application of the Bees algorithm. Multiple solutions can be found in some cases. Decision making for the best effective solution should be then considered together with other scenario like zone boundary and distance between areas. In some cases the imbalance from the last iteration is not met the minimum, it can be accepted due to its non-significant difference. This study also found that number of zones affect iterations toward the optimum. Number of areas affects the imbalance. The parameters of zone and area are then the important variables for these multi-zone dispatching systems.

Supply Chain Performance Improvement Using Vendor Management Inventory Strategy

Wei Xu¹, Dongping Song¹, Michael Roe¹

¹University of Plymouth, United Kingdom

This paper considers supply chain performance improvement in a real case study, a Chinese medium-sized aluminum manufacturer. The case supply chain is first described through process mapping. Its inefficiency is analyzed in relation to the associated information flows and material flows. A vendor managed inventory (VMI) strategy is developed and applied to the case supply chain. It is shown that the VMI strategy can significantly improve the supply chain performance such as reducing customer order cycle time and reducing safety inventory costs. Other benefits to the manufacturer and its suppliers and the implications of the VMI implementation are discussed.

Stochastic P-hub Center Covering Problem with Delivery Time Constraint

Mahdi Bashiri¹, Somayeh Mehrabi¹

¹Shahed University, Iran

In this paper, stochastic version of p-hub covering center problem (we call it Sp-HCCP) has been presented that optimizes the location of the hubs and allocation of non-hub nodes to hub nodes. The goal of our model is to maximize the minimum service-level that can achieved for a given maximum path length (delivery time on the path). We have formulated this problem using the chance constraints with a linear structure and a Genetic Algorithm (GA) has been developed to solve large scale problems. Numerical examples are solved by GA and the results are compared with exact solutions to prove the efficiency and robustness of the proposed GA. The results show that the optimal solutions are sensitive to the amount of stochastic demands also they show the precision of proposed GA method.

Session	Supply Chain Management (6)
Date	9/12/2010
Time	15:30 - 17:15
Room	NAPLES 2702
Chairs	Ushio Sumita; S.S. Mahapatra

Impacts of Random Capacity and Fluctuating Environment On Inventory Systems

Xiaoming Yan¹, Ping Cao², Minghui Zhang², Ke Liu²

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²Chinese Academy of Sciences, China

In this paper, we consider an inventory problem with random demand and random capacity in a fluctuating environment. Our objective is to minimize the total discounted cost during the whole sales horizon by choosing an appropriate replenishment policy. We show that the optimal ordering policy has an extended order-up-to type. The optimal cost function and the optimal ordering policy both have some stochastically monotone relationships with the random capacity under some mild conditions.

A Hierarchical Assessment Method using Bayesian Network for Material Risk Detection on Green Supply Chain

Benjamin Yen¹, Bingcong Zeng¹

¹The University of Hong Kong, Hong Kong

Today's social awareness of environmental protection presents the electronic companies with an irreversible trend towards green manufacturing. It raises harsh requirement for the sourcing process and imposes unprecedented pressure to the QA system, majorly due to the risk of hazardous material. As QA procedures are becoming more complicated for coping with increasing material risk and meanwhile the time and resource available are tightly constrained, the development of an effective mechanism for material testing turns up to be a critical issue. In this study, a hierarchical material risk assessment approach is proposed based on FMEA framework. Taking into account the risk occurrence, the difficulty in detection and the severity the risk causes, it enables companies to estimate their material risks dynamically using Bayesian network. With its help, companies can assess and prioritize the material risk in a systematic and efficient manner which will drive QA towards a more high-performance process.

Does Technology Capability-enriched Private Brand Impacts Customer Satisfaction and Loyalty in the Marketing Channel?

Yin-Ying Wang¹, Yung-Hsin Chen², Shuo-Chang Tsai³, Long-Tai Chen⁴

¹National Yunlin University of Science and Technology, Taiwan

²National Cheng Kung University, Taiwan

³Asia University, Taiwan

⁴Industrial Technology Research Institute, Taiwan

Marketing channel as the downstream end of a supply chain assumes a prominent role for delivering company's offerings to customers, meeting their demands, and creating cash flow for company. To ensure better customer relationship and secure more market power, retailing stores make efforts to differentiate themselves by introducing private brand products in addition to existing national brands. Globalization enables multiple national companies to make inroads into the markets of developing and emerging economies, provoking fierce competition. Based on the resource-based view of the firm (RBV), this paper develops a theoretical framework and allows a structure equation modeling (SEM) technique to empirically test the hypotheses. It is about how private brand image built on company's technology capability and intimacy out of localism influence customer satisfaction and loyalty. The findings have implications with international marketing management and fill the gap in the extant body of literature.

Corporate Myopia, Forecast Precision, and Production Planning

Zhaolin Li¹

¹The University of Sydney, Australia

This paper establishes linkages among corporate myopia, demand forecast, marketing efforts, and production planning. It shows that the option of discretionary disclosures and managerial myopia do not necessarily distort the operational activities such as marketing campaign and production, but do induce less investments in forecast precision than a benchmark does.

Constitution and Evaluation of Waste Electric and Electronic Equipment Reverse Logistics Capability

Jianchang Liu¹, Hua Zhong¹, Wenjing Wei¹

¹Beijing Institute of Technology, China

The relevant logistics capability researches are introduced and summarized. The definition of Waste Electric and Electronic Equipment (short as WEEE) reverse logistics capability is set forth. With the view of flexibility, openness and extensibility, the constitution of WEEE reverse logistics capability is analyzed and expounded. Based on the essential factors of composition, the preliminary discussions on the evaluation of WEEE Reverse Logistics Capability from the index system and quantitative methods are presented.

Optimal Single-Period Inventory Financing Decisions with Stochastic Demand

Jiayan Xu¹, Ke Fu¹

¹Sun Yat-sen University, China

Inventory financing business plays an important part in solving financing difficulty of small-and-medium-sized enterprises (SMEs). This paper develops single-period decision models from the perspective of the borrowing company. At first, we will study the borrowing company's optimal financing decision, given initial inventory quantity. Then we consider ordering decision and financing decision simultaneously, and construct a joint decision-making model. We also conduct sensitivity analysis to study how relevant parameters affect the optimal decisions of the borrowing company.

Session	Production Planning & Control (2)
Date	9/12/2010
Time	11:00 - 12:30
Room	NAPLES 2602
Chairs	Carman Ka Man Lee; Junqiang Wang

An Efficient Heuristic to Sequence Mixed-Model Assembly Lines

Rico Gujjula¹, Hans-Otto Guenther¹

¹Technical University Berlin, Germany

Sequencing mixed-model assembly lines is a well researched topic in literature. However, many methods which were developed to solve this problem fail to cope with either the large size or specific characteristics of real-life instances. In this paper, an efficient heuristic is proposed which is able to handle large and supposedly difficult problem instances. Test scenarios considering real-life aspects were generated to evaluate the performance of the heuristic for realistic problem instances. It is shown that the proposed heuristic outperforms traditional priority rule-based methods known from literature and requires a similar computational effort.

Human-computer Collaborative Approach to Subassembly Planning of Complex Product

Xiaoyi Wang¹, Huifen Wang²

¹Anhui University of Technology, China

²Nanjing University of Science and Technology, China

It is necessary to divide recursively big assembly into smaller subassemblies during assembly planning for complex product. There are some disadvantages in current dividing methods using automatic subassembly detection, such as low efficiency and poor producibility. After analyzing relationship between hierarchical structure tree and multi-level subassemblies, a new strategy of dividing subassembly based on reorganizing structure tree is firstly proposed in this paper. To improve the efficiency and practicability of subassembly planning, human-computer collaborative planning approach is further presented, which takes into account different characteristics of internal and external constraints existing in manufacturable subassembly. Validity verifying algorithms of reorganizing structure tree and performance evaluating methods for subassembly planning scheme are also given. To show the effectiveness of the above methods, case study is finally given for subassembly planning using human-computer collaborative approach.

Multi-bottleneck Permutation Flow-shop Scheduling Driven by Bottleneck

Junqiang Wang¹, Jianbin Yang¹, Jian Chen¹, Songfei Zhang¹, Shudong Sun¹

¹Northwestern Polytechnical University, Ministry of Education, China

According to the theory of constraints (TOC), bottleneck should be made full use while non-bottleneck should be subordinate to the bottleneck. However, for the multi-bottleneck permutation flow-shop scheduling problem (PFSP), different bottleneck causes different driving force resulting in different even conflicted scheduling solution. Aiming at this problem, the multi-objective mathematical model is given. Then TOC-based bottleneck-driven approach is proposed. For the bottleneck machine, the ant colony algorithm (ACA) is introduced to optimize the bottleneck scheduling. While the backward-forward approach is used to deduce the non-bottleneck's scheduling. Finally an example with 5 machines and 15 jobs was presented to illustrate the proposed approach and its validity.

Order-Lot Pegging Heuristics for Minimizing Total Tardiness in a Semiconductor Wafer Fabrication Facility

Jae-Gon Kim¹, Seung-Kil Lim², SangOh Shim³, SeongWoo Choi⁴

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³Hanbat National University, South Korea

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We consider a problem of order-lot pegging in a semiconductor wafer fabrication facility. In the problem, we determine assignments of wafers in lots to orders and plans for input release of wafers into wafer fabrication facility with the objective of minimizing the total tardiness of orders over finite horizon. The problem is formulated as a mixed integer linear program. To tackle industrial-sized problems, we develop six heuristic algorithms based on the earliest due date rule. The test results on randomly generated problems show that the suggested algorithms give better solutions than an optimization method of a commercial software package within a reasonable computation time.

An MILP Approach To Short-term Scheduling of an Industrial Make-and-Pack Production Facility with Batch Splitting and Quality Release Times

Philipp Baumann¹, Norbert Trautmann¹

¹University of Bern, Switzerland

We develop an MILP formulation for the short-term scheduling of an industrial make-and-pack plant producing consumer goods. We address a case study which includes sequence-dependent changeover times, heterogeneous storage units with finite capacities, quality release times, batch splitting, partial equipment connectivity, and transfer times. The planning problem consists in minimizing the production makespan while meeting given end-product demands. Our computational results show that for the first time, small instances of the case study can be solved to optimality within short CPU times.

Solving Production Reconfiguration based on Constraint Satisfaction

Linda Zhang¹, Qianli Xu²

¹University of Groningen, Netherlands

²Institute for Infocomm Research, A*STAR, Singapore

Production reconfiguration has been well recognized as an effective means to plan production processes for product families. The major challenge of production reconfiguration originates from the handling of numerous constraints associated with product and process variety. This paper develops a constraint satisfaction approach with a domain model to facilitate production reconfiguration decisions regarding constraint identification, representation and evaluation. An industrial example of textile spindle production reconfiguration is used to illustrate the feasibility and potential of the domain-based constraint satisfaction problem model for production reconfiguration.

Session	Production Planning & Control (3)
Date	9/12/2010
Time	13:30 - 15:00
Room	NAPLES 2602
Chairs	Seyyed Mohammad Taghi Fatemi Ghomi; Seng Fatt Wong

Hybrid Genetic Algorithm for Bi-objective Flow Shop Scheduling Problems with Re-entrant Jobs

Carman Ka Man Lee¹, Danping Lin¹

¹Nanyang Technological University, Singapore

This paper presents a simulated genetic algorithm model of scheduling the flow shop problems with re-entrant jobs. The objectives of this research are to minimize the weighted tardiness and makespan. The proposed model considers that the jobs with non-identical due dates are processed on the machines with the same order. Furthermore, the re-entrant jobs are stochastic as only some jobs are required to reenter to the flow shop. The tardiness weight is adjusted once the jobs re-enter to the shop. The performance of the proposed GA model is verified by a number of numerical experiments where the data come from the case company. The results show the proposed method has a higher order satisfaction rate than the industrial practices.

A Column Generation Heuristic for Dynamic Capacitated Lot Sizing with Random Demand Under a Fillrate Constraint

Horst Tempelmeier¹

¹University of Cologne, Germany

This paper deals with the dynamic multi-item capacitated lot-sizing problem under random period demands (SCLSP). Unfilled demands are backordered and a fillrate constraint is in effect. It is assumed that, according to the static-uncertainty strategy of Bookbinder and Tan (1988), all decisions concerning the time and the production quantities are made in advance for the entire planning horizon regardless of the realization of the demands. The problem is approximated with the set partitioning model and a heuristic solution procedure that combines column generation and the recently developed ABC β heuristic is proposed.

A Decentralized VPLs based Control Policy for Semiconductor Manufacturing

Shiqing Yao¹, Zhibin Jiang¹, Na Li¹, Ran Liu¹

¹Shanghai Jiao Tong University, China

In this paper, we propose a decentralized VPLs based control policy for semiconductor manufacturing. Based on utilizations and entropies, a new classification method is designed to decentralize global objectives into local objectives of workstations. Then, a decentralized multi-objective scheduling policy is proposed to control Virtual Production Lines (VPLs). We generate two SMS instances from Dataset 4 in order to evaluate multiple performances of the proposed policy. Experimental results validate the effectiveness in solving multi-objective scheduling problems for the semiconductor manufacturing system.

Parallel Machines Scheduling with Dual Criteria and Sequence-dependent Setups: Cooperative Metaheuristics

J. Behnamian¹, Seyyed Mohammad Taghi Fatemi Ghomi¹

¹Amirkabir University of Technology, Iran

This paper presents a min-max multi-objective procedure for a dual-objective, namely makespan, and sum of the earliness and tardiness of jobs in due window problems, simultaneously. This research extends the new hybrid metaheuristic for solving parallel machines scheduling problems with sequence-dependent setup times which comprises three components: an initial population generation method based on an ant colony optimization, a simulated annealing as an evolutionary stochastic searching algorithm, and a variable neighborhood search which involves three local search procedures to improve the population. In addition, two VNS-based hybrid metaheuristics, which are a combination of two methods, SA/VNS and ACO/VNS, are also proposed for solving the addressed scheduling problems. The non-dominated sets obtained from each of algorithms are compared in terms of various indices, and the computational results show that the proposed algorithm is capable of producing a number of high-quality Pareto optimal scheduling plans.

A Hybrid Simulated Annealing for the Single Machine Capacitated Lot-sizing and Scheduling Problem with Sequence-dependent Setup Times and Costs

M. Mirabi¹, Seyyed Mohammad Taghi Fatemi Ghomi²

¹Islamic Azad University, Iran

²Amirkabir University of Technology, Iran

Single machine capacitated lot-sizing and scheduling problem (SMCLSP) is one of the most famous fields of research in scheduling area. What makes this problem particularly difficult to solve is large and sequence dependent setups and also multiple criteria that must be considered. This paper formulates such a problem and presents a hybrid simulated annealing (HSA) for it. The superiority of HSA is shown compared to one the efficient recent heuristics. The average deviation of the HSA from the corresponding optimal solution for small size problems ranges from 0 to 10%.

A Fixed Rate Launching of Mixed-Model Car Sequencing in the Multiple Assembly Lines

Suksan Prombanpong¹, Chaiya Dumkum¹, Ekarach Satranonda²

¹King Mongkut's University of Technology Thonburi, Thailand

²Mitsubishi Motors (Thailand), Thailand

This paper aims to sequence mixed-models of assembly cars launching into the final inspection lines using a fixed rate launching interval algorithm. There are four different car models which are simultaneously assembled in the assembly lines. Finally, they are queued up for inspection at the workstations which are designed in 3 parallel lines. Due to the fact that each model has different required production demands; therefore, the exact sequencing pattern in order to meet required production rate is inevitable. Thus, the algorithm in mixed-model assembly line (MMAL) namely fixed rate launching interval is applied. However, the production requirement can't be equally divided among the mentioned 3 parallel lines. Therefore, the fixed rate launching algorithm will be applied to each line. As a result the launching interval of each line is determined at 3.390, 3.630, and 3.630 minutes respectively. It is found that the exact sequencing pattern can be obtained and the required production rate can be achieved. The idle and/or congestion times are kept at minimum; consequently, the remaining time at the end of an hour is considerably increasing from 3.495 to 9.150 minutes in line 1 and slightly increasing from 7.262 to 9.80 minute in line 2 and 3.

Session	Production Planning & Control (4)
Date	9/12/2010
Time	15:30 - 17:15
Room	NAPLES 2602
Chairs	Hsuan Pu Chang; Mohammad Mirabi

Re-engineering the Forecasting Phase Using Traditional and Soft Computing Methods

Massimo Bertolini¹, Maurizio Bevilacqua², Filippo Emanuele Ciarapica²

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²Università Politecnica delle Marche, Italy

The aim of the work is verifying the possibility of extrapolating information on demand trends, for a company specialized in the production of aluminium tins, using the data collected in previous periods. This study is mainly divided into three stages: (1) data pre-processing (data collection) stage, (2) adaptive network evaluating stage and (3) forecast and recall stage. At the stage of data collection, the data are divided into four categories: time serial data, macroeconomic data, downstream production demand data and industrial production data. The company analysed in this work usually carried out the prediction activities by means of expert judgement. In the case analyzed, four models were developed in order to predict the monthly number of tins: three traditional methods based on historical series and neural networks. Soft computing models were compared with traditional prediction models. Particularly the Holt-Winters forecasting method was tested developing a model that take into account seasonal phenomena.

Incremental Temporal Reasoning in Job Shop Scheduling Repair

Yi Huang¹, Li Zheng¹, Brian Williams², Lin Tang¹, Huasheng Yang¹

¹Tsinghua University, China

²Massachusetts Institute of Technology, United States

A working predictive schedule can be useless because of the various external or internal disruptions in a job shop. Total rescheduling may cause problems such as shop floor nervousness. Thus, the job shop scheduling repair (recovery) approach aims at generating a solution satisfying the updated constraints and making deviations minimized. We propose an incremental temporal reasoning approach in this paper to solve job shop scheduling repair problems. Specifically, such a problem is formulated as a disjunctive temporal problem (DTP), framed as an optimal constraint satisfaction problem (OCSP) formally, and finally solved by performing an algorithm integrating incremental temporal consistency and efficient candidate generation. Through involving human interactive mechanism, domain experts can make higher quality decisions by balancing makespan and deviations.

A GA-Based Heuristic Algorithm for Non-Permutation Two-Machine Robotic Flow-Shop Scheduling Problem of Minimizing Total Weighted Completion Time

Juntao Li¹, Lizhen Zhang¹, Chunxia Shangguan¹, Hiroshi Kise²

¹Shanghai Ocean University, China

²Kyoto Institute of technology, Japan

We discuss a scheduling problem for a two-machine robotic flow-shop with a bounded intermediate station and robots which is realistic in FMCs (flexible manufacturing cells). The problem asks to minimize the total weighted completion time. It is NP-hard. In this paper, we propose a heuristic algorithm based on GA (Genetic Algorithm) which is applicable to the problem, and which allows not only permutation, but also non-permutation schedules, because the latter has possibility to improve the former for this objective function. It is shown by numerical experiment that the proposed method is more effective than existing heuristics, and that there are some situations where the non-permutation scheduling is better than the permutation one.

Autonomous Product Manufacturing Cycle An Integrated Approach to Process Planning and Production Control

Katja Windt¹, Oliver Jeken¹

¹Jacobs University Bremen, Germany

The complexity of nowadays logistics processes calls for new approaches to improve the logistics performance. The concept of autonomous logistics processes has proven to be a promising way to cope with these challenges. In this paper the idea of autonomous product manufacturing will be presented with a special focus on an integrated approach to process planning and production control. In particular we introduce a new way to let products decide by themselves what to become and how. Based on current findings in flexible and reconfigurable process planning, a framework for autonomous production will be presented. Following a critical discussion of the contributions and limitations of the proposed approach further research will be addressed.

A Simulated Annealing-based Approach for Dynamic Facility Planning

Tzer-Ming Chen¹, Ching Chih Chen¹, Shan-Ping Chuang²

¹National Taipei University of Technology, Taiwan

²Huafan University, Taiwan

A poor facility design can be costly, and may lead to poor-quality products, low employee morale and customer dissatisfaction. Typically, the facility layout is decided when the facilities are first set up. However, product variety, process improvement and technology improvement can make the original layout plan inefficient. Since the facility layout problem is a NP-hard problem, an optimal solution is difficult to obtain. This study uses a simulated annealing (SA)-based approach to solve the dynamic layout problem, considering the handling cost, the facility moving cost, and the facility setup cost.

A New Numerical Method of Nonlinear Equations by Four Order Runge-Kutta Method

Ruitao Lin¹, Chan Wang¹, Fang Liu¹, Yueliang Xu¹

¹Southwest Jiaotong University, China

In this paper, we use homotopy method to transfer nonlinear equations to a differential equations, then we apply four-order Runge-Kutta method to solve the differential equations for getting a more stable and easily convergent solution. What is more important, we demonstrate a complete proof of the whole process, which provide a scientific foundation for the method as a whole. In the end, we give a specific example that is solved by the approach we have proved, which shows the efficiency and stability of the method. With the new methods, some certain nonlinear equations can be simply and precisely calculated, which can contribute to production planning and control or operation problems significantly.

Session	Service Innovation & Management (3)
Date	9/12/2010
Time	11:00 - 12:30
Room	NAPLES 2701
Chairs	Li Yueh Chen; Linda Zhang

A Simulation on Impacts of a Dynamic Pricing Model for Perishable Foods on Retail Operations Productivity and Customer Behaviours

Jaekwon Chung¹, Dong Li¹

¹University of Liverpool, United Kingdom

This paper developed a dynamic pricing strategy for perishable foods based on prior optimal and dynamic pricing models for perishable foods. The proposed strategy is expected to transform consumer purchasing patterns in a more strategic way with advanced tracking solutions, and to significantly curtail waste and increase retail service operations productivity. Based on information from interviews and surveys, a simulation was conducted to investigate impacts of the proposed strategy on retailer productivity and customer behaviours.

Identify Lead Users by Customer Competence

Guozheng He¹, Jianan Yu²

¹Wuhan Textile University, China

²SAP Labs China, China

Enterprises should let Lead Users participate in new product development. But in practice, it's very difficult for enterprises to identify lead users from a large amount of common consumers. Since lead users have stronger competencies than common users, customer competence can be used as a dimension to measure lead users. Based on this, a model of identifying lead users by computing their competencies is built. By dividing customer competencies into several indicators, a weighted competence value can be computed. The users with the highest competence value can be considered as lead users. This model can help enterprises identify lead users more easily in practice.

The Application of Lean Concept Combines Demand Channel and Supply Channel in Service Industry

Yao-hung Hsieh¹, Hsiao-Ching Chen², Wei-Lung Chang²

¹China University of Technology, Taiwan

²Chungyu Institute of Technology, Taiwan

Based on the concept of lean, the consumption cycle of demand channel and supply channel is investigated in this paper. Moreover, the combination of relationship between customer demand, lean service, lean marketing, lean consumption, lean design and lean production is studied to derive the expectative benefit from the application of the consumption cycle model of demand chain in service industry. Especially hotel industry is applied as a case study. The model is expected to prove the point that the advantages of willing consumption from customers and resources waste and cost reducing from producers enables both of customers and producers to create their benefits. Once a hotel executes the consumption cycle model of demand chain, both hotels and customers are able to reach the win-win situation from dominant strategy equilibrium that makes up an optimum consumption cycle. Moreover, the cost from manufacture and consumption is reduced, customer needs is satisfied, and hotels' productivity and consumer buying power are raised. All of causes help forward improve the speed of consumption cycle.

Applying Adaptive Course Caching and Presentation Strategies in M-learning Environment

Hsuan Pu Chang¹

¹Tamkang University, Taiwan

The use of portable device like pocket PCs and smart phone to support teaching and learning is not a new concept. Although the variety of mobile platforms provide more flexible and extendable learning experience, the various hardware restrictions consequently become the unavoidable challenges and barriers we need to overcome. In this paper we focus on: (1) improving the learning performance by prefetching the upcoming learning content; (2) improving the reading experience on small screen by adaptive content presentation; (3) distributing the well presentation learning content corresponding to user's specific mobile platforms by multi-presentation course package. There are four Web Service based modules proposed to carry out the above ideas.

The Impacts of Brand Trust, Customer Satisfaction, and Brand Loyalty on Word-of-Mouth

Shu-Hsien Liao¹, Yu-Chun Chung¹, Yun-Ru Hung¹, Retno Widowati¹

¹Tamkang University, Taiwan

The study mainly investigates the relationships among brand trust, customer satisfaction, brand loyalty, and word-of-mouth. Nowadays, the automotive industry is facing the competitive environment. Whether the industry can enhance brand trust, increase customer satisfaction, and then improve brand loyalty and word-of-mouth, which is the key issue of this study. Toyota was selected as the object of this study. 375 questionnaires were provided and 258 valid replies were received. This study uses the structural equation model to empirically explore the relationships among brand trust, customer satisfaction, brand loyalty, and word-of-mouth. The results indicate the best model is causal chain, that is, brand trust must affect brand loyalty through customer satisfaction initially, and then impact word-of-mouth through brand loyalty.

Evaluation on the Technological Innovation Capability in Companies Based on the Network

Xiao-li Chen¹, Ralph Riedel¹, Egon Mueller¹

¹Chemnitz University of Technology, Germany

Considering the importance of network for technological innovation, this paper takes a new view on technological innovation capability (TIC) and develops TIC indicator system, moreover, it setups a framework for the TIC evaluation in companies. With works on the innovation process and innovation success and failure experiences, it highlights the importance of network for the achievement of technological innovation, and designs the TIC indicator system including innovation input / process / network / management / output capability, which tries to have a comprehensive understanding on the TIC system in companies. Moreover, based on the fuzzy set theory, a framework is established for the weighting of indicators and the evaluation of the TIC level in companies. Case study based on the finding of an online survey is used for the illustration and validation on the proposed framework.

Session	Operations Research (2)
Date	9/12/2010
Time	13:30 - 15:00
Room	NAPLES 2701
Chairs	Yong-Zai Lu; Kaveh Sheibani

The Hierarchical Hub Maximal Covering Problem with Determinate Cover Radiuses

Rashed Sahraeian¹, Ehsan Korani¹

¹*Shahed University, Iran*

Hierarchical facility location problems with three levels deal with location of facilities in any level and assignment traffic to given routing. Hub covering problems covered the demand nodes, if they are within a particular radius of a facility that can supply their demand. This paper study the single allocation hierarchical hub maximal covering problem over complete network linking in the first level, that is consists of hub facilities known as central hubs and in the second and third levels are star networks linking the hubs to central hubs and the demand places to hubs or central hubs. The problem assigns every non-hub nodes and hubs to their top level facilities with predetermined cover radiuses, and minimizing the total cost. The cover radiuses computed with a heuristic method finally present a mixed integer programming model for this problem and test the performance of the problem on the CAB data.

Generating Large Scale Undirected Graph for Solving Flow Network Problems

Shin-Guang Chen¹

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 graphs for test. This paper proposes an algorithm to generate a large scale undirected capacitated/uncapacitated graph for applications. Conventionally, NETGEN is employed for such purposes. But this program is about 30 years old and no algorithm available for verifying the properties of the generated graphs. Moreover, it only created directed graph. For undirected flow network problems, there is no algorithm available in the literature. In this paper, a theoretical aspect and new features are addressed. This algorithm is not an extension of NETGEN. The undirected versions of the 40 benchmarks in NETGEN are inspected in this paper. NETGEN had a limited size of 8000 nodes and 35000 arcs in different graphs. 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 43 lines is tested for examples.

Process Management Systems and Public Healthcare in Brazil: Technology to Improve Service Delivery

Daniel G. S. dos Santos¹

¹*CEFET/RJ, Brazil*

The reality of healthcare delivery in emerging societies are not good enough for most of its population. This article aims to explore how the analytical and monitoring capabilities of information systems know as BPMS (Business Process Management Systems) could improve the quality of services provided in Brazil. We propose that the adoption of a service science and process-centric view will be of great value to help the public health manager evaluate its quality gaps while fostering better comprehension of the system dynamics and making clear points for policy changes.

Genetic Algorithm Based Optimization of an Agent Based Queuing System

Karthik Sankaranarayanan¹, Erik R Larsen¹, Ann Van Ackere², Carlos Arturo Delgado²

¹*University of Lugano, Switzerland*

²*University of Lausanne, Switzerland*

Queuing research and its applications have been studied extensively by concentrating mainly on design, performance and running of the service facility under study. In this paper we show how a simple behavioral queuing system can be modeled using a Cellular Automata; and then we show how a Genetic Algorithm can be used to optimize the behavioral properties of this agent based model.

A Revenue Management Model in BTO Manufacturing Over an Infinite Horizon

Li Li¹, Zhixiang Chen¹

¹*Sun Yat-Sen University, China*

This research examines the pricing and capacity utilization decisions facing a BTO manufacturing firm serving customers that are segmented by different lead-times. We model the firm's operation as an M/M/1 queue and treat the demand of each segment as being linear in price. We characterize the optimal decisions and present numerical examples to validate the benefits of applying RM in BTO manufacturing and the impacts of lead-times on optimality.

Simulation Modeling and Analysis on Asset Planning for Emergency Medical System (EMS)

Jieping Liu¹, Xiaocong Wang¹, Ming Cheng E¹

¹*Beijing Jiaotong University, China*

In recent decades, health care cost has increased dramatically, while health care organizations have been under severe pressure to provide improved quality health care for their patients. Several health care administrators have used discrete event simulation as an effective way for allocating resources to improve patient flow, while meeting health care delivery budget and increase patient satisfaction. The rapid growth in simulation software technology has created numerous new application opportunity, including more sophisticated implementations, as well as combining optimization and simulation for complex integrated facilities. This paper surveys the application of discrete-event simulation modeling to healthcare systems of clinics. We also present the overview of how simulation was used to investigate the reduction of waiting times in the Emergency Medical System of a mid-size city, as well as in meeting future demand growth while minimizing long term capital expenditures.

Session	Operations Research (3)
Date	9/12/2010
Time	15:30 - 17:15
Room	NAPLES 2701
Chairs	Roel Leus; Zhaotong Lian

Multiplicative Methods for Entropy Programming Problems and Their Applications

Yuri Popkov¹

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The problems of entropy functions maximization over the sets specified with the simultaneous linear or quadratic equalities and inequalities (the problems of entropy-linear and entropy quadratic programming) are under consideration. Multiplicative algorithms with p-active dual and primal variables are proposed for such problems solving. Active variables are selected using the feedback about p-maximal errors in the equations of complement non-rigidity. A convergence of the algorithms proposed is studied. The results of such methods application for the problems of investment portfolio formation and traffic modeling are considered.

An Effective Heuristic Considering Machine Flexibility for Parallel Machine with Eligibility Problem

Rong-Hwa Huang¹, Tung Han Yu²

¹*Fu Jen Catholic University, Taiwan*

²*Graduate Institute of Business Administration, Taiwan*

Parallel machine with eligibility scheduling problem is commonly seen in manufacturing industries such as semi-conductor manufacturing. This paper takes flexibility concept into consideration and develops a novel heuristic algorithm to minimize makespan of the problem. Mathematical model is developed as an effectiveness comparison to this algorithm. Data test uses random generated problem with given parameters, and the result shows that proposed algorithm can achieve very close or exact solution to optimality.

The Fuzzy Greedy Search in Combinatorial Optimization with Specific Reference to the Travelling Salesman Problem

Kaveh Sheibani¹

¹*Iran Telecommunication Research Center, Iran*

This paper describes a hybrid meta-heuristic for combinatorial optimization problems with specific reference to the travelling salesman problem (TSP). The method is a combination of genetic algorithms (GA) and greedy randomized adaptive search procedures (GRASP). A new adaptive fuzzy greedy search operator is developed for this hybrid method. Computational experiments using a wide range of standard benchmark problems indicate that the proposed hybrid meta-heuristic is very efficient.

Computing Fixed Points of an Increasing Mapping from a Finite Lattice Formed by Integer Points of a Box into Itself

Chuangyin Dang¹

¹*City University of Hong Kong, Hong Kong*

For a finite lattice $(D_I, \leq)$ consisting of integer points in an n -dimensional box D of $\mathbb{R}^n$ and an increasing mapping ψ from D_I into itself, the well-known Tarski's fixed point theorem asserts that there exists a point $x^* \in D_I$ such that $\psi(x^*) = x^*$, which is a fixed point of ψ in D_I and has applications in supermodular games from economic analysis. To compute such a fixed point, an arbitrary starting simplicial algorithm is developed in this paper through an introduction of an integer labeling rule and an application of a triangulation of $\mathbb{R}^n$. The algorithm consists of two phases, one of which forms a variable dimension pivoting procedure and the other a full-dimensional pivoting procedure. Starting from an arbitrary integer point in D , the algorithm interchanges from one phase to the other, if necessary, and follows a finite simplicial path that leads to a fixed point of ψ in D_I . The interchanging step is essential to ensure that the algorithm converges to a fixed point. A significant advantage of the algorithm is its arbitrary starting feature, which can certainly benefit from any information on where a fixed point may be found.

A Lagrangian Heuristic for a Dock Assignment Problem with Trailer Transportation

Lotte Berghman¹, Roel Leus¹

¹*Katholieke Universiteit Leuven, Belgium*

This paper presents a Lagrangian heuristic that combines Lagrangian relaxation with an enumerative search tree for finding high-quality solutions to a dock assignment problem. Trailers are assigned to gates 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. After loading or unloading, a trailer cannot be transported to the parking lot by a terminal tractor if all tractors are busy. The trailer remains at the gate until a terminal tractor becomes available, which may prevent other trailers from being loaded or unloaded there. We refer to this phenomenon as blocking. The problem is modeled as a threestage flexible flow shop.

Session	Human Factors (3)
Date	9/12/2010
Time	11:00 - 12:30
Room	NAPLES 2601
Chairs	Sue Morton; Zhizhong Li

Investigation of Ergonomics in Automotive Assembly Line Using Jack

Jianwei Niu¹, Xiaowei Zhang¹, Xin Zhang², Linhua Ran²

¹University of Science and Technology Beijing, China

²China National Institute of Standardization, China

The objective of this study is to improve the workplace layout and assembly standard in automotive assembly line by ergonomic simulation of manual assembly tasks. The installation of fog lamps, which involves 120 actions within 58.63 seconds, was simulated using Siemens Jack incorporated with Chinese digital human model. The inefficient actions were found out and the computer manikins physiological performance was evaluated by using some typical ergonomic methods such as RULA and NIOSH lifting equation. The physiology workload of workers was improved by re-layout the workplace and work process. As a consequence, the time of installing the two fog lamps was shortened to 42.87 seconds. Comparative analysis shows that the new solution is much safer, more efficient and more comfortable for assembly work.

Leading a Technical Organization through Change: A Focus on the Key Drivers Affecting Communication

Travesh Ramkhelawan¹, Marie-Louise Barry¹

¹University of Pretoria, South Africa

The objective of this study was to determine the key factors within communication which facilitates the change process in a technical organization, thereby allowing the organization to reap the true benefits of the change. The results aim at improving the efficiency of roll-out by ensuring that the correct aspects of communication are adequately addressed during the change process. The research was conducted on a technical organisation, where the majority of the workforce comprised highly skilled and qualified individuals focusing on developing cutting edge technological innovations. Two rounds of Delphi questionnaires were used where the first-round questionnaire was analyzed to formulate the second-round questionnaire. The second-round questionnaire was used to determine the desirability, feasibility and importance of each of the factors under review. The study identified key change information to be communicated, the method of communication, and frequency of communication, preferred communicator and the necessity of the organization to understand the change information.

Human Errors Reliability Analysis in Coal Mine Accidents Based on Gray Relational Theory

Jianyi Lan¹, Meiying Qiao¹

¹Henan Polytechnic University, China

Human errors which have been affecting safety accidents are one of the main reasons in coal mine. So these Accidents can be prevented and reduced through analyzing human errors affecting factors. This paper has made elaborate analysis of the relative affecting factors which cause human errors through applying the Gray Relational Theory in coal mine accidents. Based upon this specific analysis, by comparing statistics data of affecting factors to mine accidents, a relevant reliability analysis method has been come up with in this paper. Based on the analyzing results, the key factors, which affect human errors, are ordered according to their importance. Finally, the corresponding method is put forwards to reduce human errors in coal mine accidents according to the analyzing result.

A Study on Human Redundancy in Execution of Computerized Emergency Operating Procedures

Xiaolu Dong¹, Zhizhong Li¹

¹Tsinghua University, China

This study examined the effects of human redundancy arrangements on performance in the execution of computerized emergency operating procedures. It was found that there was significant difference in completion time but no significant differences in error rate or subjective workload between single-operator and two-operator setups. For the two-operator setup, an unbalanced workload was found. Team completion time was significantly lower than the higher and averaged completion times of individual operators, but was not significantly different from the lower completion time of individual operators. The higher error rate of individual operators was significantly higher than the team error rate, but there were no significant differences between the team error rate and the lower and averaged error rates of individual operators. These findings indicate the complex nature of human redundancy when using digital systems.

A Study of Occupational Stress of Aviation Ground Crews

Kuo-Shun Sun¹, Yu-Shan Lee¹

¹Nainan University, Taiwan

The aim of this study was to explore the relationship between various sources of occupational stress and work performance in aviation ground crews. It was also to explore the connection among occupational stress, coping strategies and work performance by using the Structural Equation Modeling (SEM). The result of analysis exhibited that occupational stress had a negative impact on work performance and the coping strategies were the mediator survives between occupational stress and work performance.

An Operational Framework in Forecasting Radical Innovation: The Case of the CO2-free Automobile

Jean-Jacques Chanaron¹

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This article deals with a framework of the process of innovation which is designed to help building up forecasting scenarios for breakthrough innovations in mature industries. It is based on previous research on innovation and on an up-to-date literature review of key success factors of innovation. It is applied to the various technological powertrain options faced by the automotive industry due to need of reducing fossil fuel consumption and CO2 emissions. It gives an appraisal of the various economic, technological, social and political factors which could influence a particular technology allowing a tentative scenario for the next 30 years.

Session	Quality Control & Management (2)
Date	9/12/2010
Time	13:30 - 15:00
Room	NAPLES 2601
Chairs	Philippe Castagliola; Fugee Tsung

An Integrated T and TCUSUM Scheme

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This article proposes an integrated scheme (T&TCUSUM chart) which combines a Shewhart T chart and a TCUSUM chart (a CUSUM-type T chart) to monitor the time interval T between the occurrences of an event or the time between events (TBE). The performance studies show that the T&TCUSUM chart can effectively improve the overall performance over the entire T shift range. On average, it is more effective than the T chart by 26.66% and the TCUSUM chart by 14.12%. Moreover, the T&TCUSUM chart performs more uniformly than other charts for detecting both small and large T shifts, because it has the strength of both the T chart (more sensitive to large shifts) and the TCUSUM chart (more sensitive to small shifts). The implementation of the new chart is almost as easy as the operation of a TCUSUM chart.

A Single Chart for Monitoring Frequency and Magnitude of Events

Zhang Wu¹, Qu Liang¹

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This article presents a single Statistical Process Control (SPC) chart for simultaneously monitoring the time interval T and magnitude X of an event. The new chart is called a G chart as it deals with a synthetic statistic G. The G chart makes use of the information about the event frequency as well as the information about the event magnitude. Moreover, its detection power can be allocated in an optimal manner between that against T shifts and that against X shifts, and between that against small shifts and that against large shifts. As a result, the G chart is more effective than all other charts currently available in the literature for detecting the out-of-control status of an event. Moreover, comparing with other charts, the G chart performs more uniformly for detecting process shifts of different types and sizes.

Preliminary Results Concerning the VSS Xbar Chart with Unknown In-Control Parameters

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The VSS Xbar chart is known to perform better than the traditional Xbar control chart in detecting small to moderate mean shifts in the process. Many researchers have used this chart in order to detect a process mean shift under the assumption of known parameters. However, in practice, the process parameters are rarely known and are usually estimated from an in-control Phase I data set. In this paper, we evaluate the (run length) performances of the VSS Xbar control chart when the process parameters are estimated and we compare them in the case where the process parameters are assumed known. We draw the conclusion that these performances are quite different when the shift and the number of samples used during the phase I are small.

Linear Profile Monitoring Using an Adaptive EWMA Control Chart

Giovanna Capizzi¹, Guido Masarotto¹

¹University of Padua, Italy

A novel adaptive Exponentially Weighted Moving Average scheme, called AEWMA3, is suggested for monitoring the stability of a linear relationship between a quality characteristic and an explanatory variable. Comparisons with an analogous non-adaptive scheme points to a better overall performance of the suggested scheme in a variety of out-of-control scenarios. In addition, since a single AEWMA3 chart is able to quickly detect both small and large shifts, its practical design is simpler than that of other competing control charts.

Monitoring a Process with Mixed-Type and High-Dimensional Data

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Statistical process control (SPC) techniques that originated in manufacturing have also been applied to monitoring the quality of various service processes, which can be characterized by one or several variables. Conventional multivariate SPC methods usually have an underlying distribution, generally multivariate normal, assumed for the process variables. However, in many cases, the distribution assumption cannot be easily made, or the assumption made is not appropriate. For instance, the quality characteristics of a service process may include both continuous and categorical variables (i.e., mixed-type variables). In this case there will be no specific distribution to assume. Direct application of conventional SPC techniques to monitor such mixed-type variables may cause increased false alarm rates and misleading conclusions. To further complicate the case, the number of variables is usually large (i.e. high-dimensional variables). This paper enumerates the difficulties in monitoring a process with mixed-type and high-dimensional data and discusses potential solutions.

EWMA Control Chart that Minimizes the Numbers of Defectives for Out-of-Control Cases

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²Nanyang Technological University, Singapore

This article develops an algorithm for the optimization design of Exponentially Weighted Moving Average (EWMA) control charts. The design algorithm adjusts the sample size, sampling interval and control limits of the chart in an optimal manner in order to minimize the mean number of defective units (denoted as MD) produced per out-of-control case. The optimal chart is therefore named as the MD-EWMA chart. The probability distribution of the random process shifts (e.g. mean shift) is taken into account and is modeled by a Rayleigh distribution based on the sample data acquired during the operation of the control chart. Unlike the economic control chart designs, the design of the MD-EWMA chart only requires limited number of specifications that can be easily determined. The design of the proposed MD-EWMA chart is illustrated through an example.

Session	Quality Control & Management (3)
Date	9/12/2010
Time	15:30 - 17:15
Room	NAPLES 2601
Chairs	Kaibo Wang; Yaoguang Hu

Soft Sensor Modeling for Feed Liquid Viscosity Control for PVC Gloves Based on BP Neural Network

Yaoguang Hu¹, Cheng Xi¹, Xiangmin Cui¹, Ruijun Zhang², Yan Yan¹

¹Beijing Institute of Technology, China

²Renmin University, China

In the plastics Industry, feed liquid viscosity is always a vital input factor to the quality of final products, but difficult to realize real time measurement. Thus, in this paper, a data-driven soft sensor was developed to help control the viscosities of feed liquid in the production of PVC gloves which contribute a lot to the final quality and rating of gloves on the basis of literature review and study. BP neural network was selected to build the MIMO control model after discussing the methods in data pre-processing. The result shows that the inverse quality model has good performance in deciding the input values of feed liquid viscosity.

A Spatial Multivariate Process Capability Index

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Process capability ultimately decides process quality level. Based on analyzing process capability index (PCI), Process capability may be effectively assured. For the multivariate manufacturing processes, tremendous difficulties are often encountered when one attempts to measure the process capability by directly extending the univariate approach. After analyzing the multivariate Cpm method (Chan et al. 1991), the paper presents a spatial multivariate PCI method, which can solve multivariate off-centered case and may provide references for assuring and improving process quality level while achieving overall evaluation of process quality. At last, examples for calculating multivariate PCI are given and the experimental results show that the systematic method presented is effective and actual.

Statistical Process Adjustment of Multivariate Processes with Minimum Control Efforts

Li Wang¹, Kaibo Wang²

¹University of South California, United States

²Tsinghua University, China

In controlling a multiple-input-multiple-output (MIMO) process, usually all control variables have to be adjusted at each step, which may incur high adjustment cost. This paper proposes a Lasso adjustment algorithm, which minimizes the number of variables to be adjusted at each step. Simulation results show that the proposed algorithm can maintain acceptable output deviations while reduce the number of variables need to be adjusted significant.

Competitive Analysis in Digital Electronics Industry of Pakistan

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²Center for Advance Studies in Engineering, Pakistan

In today's world of increasing competition, it is very necessary to keep up with the pace of ever changing customer demands. A method to measure the competitiveness of a firm in the industry is through the analysis of competitive framework. This paper measures the competitiveness of Palmchip Corporation, which is operating in Digital Electronics Industry with its competitor Nextek. In order to perform the competitive analysis data was collected through survey by making questionnaire. It was found that Palmchip Corporation has an edge over its competitor Nextek in the Digital Electronics Industry. This paper can help the Palmchip Corporation in further looking at their high points and low points with respect to its competitor Nextek and hence further cement its chances of increasing its market share in the industry.

Using Forecasting Technique in Quality Function Deployment to Facilitate Dynamic Customer Needs

Liang-Tsung Lin¹, Ching-Pou Chang¹, Kuen-Ho Chiang¹

¹Hsiuping Institute of Technology, Taiwan

A proposed method of using forecasting technique in quality function deployment to facilitate dynamic customer needs based on historical, present and predicted data sets is presented. With the use of the proposed method, the importance of each customer needs is monitored and analyzed and the importance of each design requirements is evaluated in order to fulfill dynamic and future customer needs. Doing so would allow companies to plan customer needs in advance, fulfill their needs, and , most importantly, significantly improve customer satisfaction and enhance their competitiveness in the marketplace

Quality Computation Model of Complex Assembling Process Using Multivariate Process Capability Index

Yihai He¹, Wenbing Chang¹, Wei Ping Mu¹

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Assembling is the last phase of producing, which is influential to product quality directly, and estimating the quality of total assembling process is the prerequisite to identify the latent problems and implement quality improvement. In this paper, a quality assurance model of assembling is put forward firstly, then based on the relationship of machining and assembling, the multivariate process capability index mainly used in machining process is applied to measure the quality of assembling process. Furthermore, a method of assembling quality computation for complex products based on process capability index is proposed. Finally, an application example of a mechanical product is provided to show the correctness and validity of the method.

SWOT Analysis of Mobile Telecommunications Sector of Pakistan

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This paper aims to perform SWOT analysis of the mobile telecom sector in Pakistan. Detailed study has been carried out by conducting surveys with subjects having different backgrounds and belonging to different professions, regions and age groups. A comparative study of the mobile networks presently operating in Pakistan has been performed. It is found that telecom sector has significant potential to further expand and establish itself in far flung regions of Pakistan. With the emergence of new technologies worldwide, telecom industry in Pakistan has a lot to benefit from and offer high quality services to mobile phone users. By adopting the proposed strategies, telecom industry can significantly increase its market share and establish itself as the primary means of communication.

Session	Safety, Security & Risk Management (1)
Date	9/12/2010
Time	11:00 - 12:30
Room	SICILY 2502
Chairs	Sou-Sen Leu; Takashi Hasuike

The Role of Safety Leadership in Improving Organization

Minna Paivinen¹

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The promotion of safety is often carried out from a safety management perspective which plays an important role in safety work. Moreover, safety leadership is increasingly being seen as important in the development of safety culture, climate and performance and the attainment of overall improvement in the field. The goal of this study is to create innovative research approaches into safety leadership. Thus a network has been set up among three Finnish universities: the University of Tampere, University of Jyväskylä and Tampere University of Technology. The main purpose of this interdisciplinary network, named LEADNet, is to promote research into the various aspects of leadership and integrate the findings into the field of knowledge.

Public Debt of Medical Security System: Is China Following in America's Footsteps?

Shibin Song¹, Lizhi Feng¹, Xiaojun Xue¹, Mingmei Huang¹

¹*Sun Yat-sen University, China*

China's social medical security system includes medical insurance for urban workers, medical insurance for urban residents, new type of rural cooperative medical care and medical assistance. To solve the problem of inadequate and unaffordable medical services, the government has provided a large number of public financial subsidies for this system. But similar to America, China's population aging and rapidly rising medical costs will cause a growing fiscal subsidy burden. In this paper, by means of insurance actuarial methods, we predict the medical insurance system's long-term balance of payments, medical assistance cost and their public debt risk. Results show that China is following in America's footsteps: A great gap between revenue and expenditure will arise under PAYG system, which is beyond government's financial capability. We should reform its financing model and strictly control the rising medical costs, so that the medical security system can possibly achieve sustainability.

Oil Sensitivity and Systematic Risk in China O&G Industry Stock Indices

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¹*Harbin Institute of Technology, China*

²*China Executive Leadership Academy Pudong, China*

In order to solve the multi-attribute factors analysis problem of China Oil and Gas industry, a multifactor market model is used to estimate its expected stock returns. Results are presented to show that volatility of exchange rate and crude oil prices have large and significant impacts on China oil and gas industry stock returns. In particular, an increase in the market or oil price factor increases the returns to China oil and gas stock indices while an increase in exchange rates or the term premium increases the returns to the stock prices of China oil and gas industry. Furthermore, the oil and gas sector is less risky than the market and its moves are pro-cyclical. The analysis suggests that China oil and gas industry stocks may be a good hedge against inflation.

Safety Analysis of the Single-walled Steel Suspension Box Cofferdam During Construction

Zanyun Xu¹, Wei Xu¹

¹*Tongji University, China*

The construction of the Steel Suspension Box Cofferdam (SSBC) is an important procedure for constructing the pile cap. In this paper, a safety analysis is carried out based on the construction of Chongqi Yangtze River bridge primary NO.2 pier SSBC. First, all calculation construction conditions and the corresponding loads are clarified. Second, with the use of ANSYS finite element analysis software, the corresponding finite element model is set up to evaluate its safety during construction. The results show: In the construction process, load and boundary conditions are constantly changing which makes the load transfer path and the mechanical characteristics of the various components also change. The load transfer pattern is hanging box - crane lifting point at first. Then it becomes hanging box - cantilever beam - steel pipe pile, and at last it changes into a dual transfer pattern of hanging box - cantilever beam - steel pipe pile and hanging box - sealing bottom concrete - steel pipe pile. The sealing concrete at the bottom has a strong binding effect on SSBC's displacement condition. And the critical condition occurs when pumping out water at high tide level.

Synergic Mode of Grid-based Traffic Risk Control in China's Coastal Waters

Jinpeng Zhang¹, Quangen Fang¹, Shenping Hu¹

¹*Shanghai Maritime University, China*

Grid is one of the most important information technologies in recently years, and its theory has been applied in a variety of industries. Based on grid management, the synergic mode has been established on the three levels (management, operation and support) of the maritime administration combined with three periods (before, in progress and after) of the marine accidents in China's coastal waters. Accordingly, some practicable measures of the management mode have been put forward, on the basis of case study of Maritime Safety Administration (MSA) Fujian, concluding that it is improving emergency handling ability in Fujian coastal and harbor waters, and accident frequency reduced from 0.0741% of 2006 to 0.0485% of 2008.

Relative Risk Assessment Methodology in Vessel Traffic at Sea

Shenping Hu¹, Quangen Fang¹, Jinpeng Zhang¹, Yongtao Xi¹

¹*Shanghai Maritime University, China*

The Ship Formal Safety Assessment (FSA) is the premier scientific method that is currently being used for the analysis of maritime safety and the recommendations of concerned regulatory policy. This paper conducts an overview of the FSA methodology and proposes ways to improve it. The applications of both quantitative risk analysis (QRA) and risk-based decision making techniques were discussed, and possible pitfalls or other deficiencies are identified. Then proposals of relative risk assessment methodology are made to alleviate such deficiencies, with a view to achieve a more transparent and objective approach. The results of this paper may be useful if a revision of the FSA tools is contemplated along these discussions.

Session	Safety, Security & Risk Management (2)
Date	9/12/2010
Time	13:30 - 15:00
Room	SICILY 2502
Chairs	Shibin Song; I-Tung Yang

HFACS Model Based Data Mining of Human Factors-A Marine Study

Yongtao Xi¹, Weijiong Chen¹, Quangen Fang¹, Shenping Hu¹

¹Shanghai Maritime University, China

It is well known that human error is the key contributor in most marine accidents. Nevertheless, human error is not the cause of accidents or mishaps in the new view on human errors, it is the deeper trouble of the MMEM (Man-Machine-Environment-Management) system. The key point for human error analysis is to find out the connection between human error and the features of system elements, that is the contexts of human error (Operating environment, Organization influence, etc). For this reason, this paper shows an approach for mining the human factors data which influence the occurrence of human error. This approach bases on the data collected on HFACS (Human Factor Analysis and Classification System) Model. It can be used for analysis of human factors and risk management of marine industry.

Applied Real-time Bayesian Analysis in Forecasting Tunnel Geological Conditions

Sou-Sen Leu¹, Tri Joko¹, Abraham Sutanto¹

¹National Taiwan University of Science and Technology, Taiwan

Unforeseen ground conditions not only affects our schedule and imposes large extra costs but may also introduce additional hazards in the tunnel project. Crucial pre-construction phase decisions and construction phase decision are strongly influenced by expected ground condition. A geological prediction model to quantify the risk of tunneling and predict the ground condition for un-excavated part of the tunnel using real time Bayesian analysis is proposed. One of the real time Bayesian analysis simulation techniques, Particle Filter Algorithm (PF), is used to simulate the geological prediction profile for un-excavated tunnel parts. In this paper a tunnel drainage project at Zhonghe area, Taipei county, Taiwan is used as a case study of the proposed model and a validation purpose. Compared with Iterative Bayesian Updating Approach (IBUA) proposed by Ioannou, the model that we proposed using the simulation technique gives a better prediction result. The results prove that the geological prediction model proposed is useful for decision making.

Design of the Late-model Key Exchange Algorithm Based on the Polymorphic Cipher

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³Xidian University, China

Diffie-Hellman key exchange algorithm, which is used in regular scenes base on the discrete logarithm problem, demands that typically two communication parties should struck up a lively conversation leading to a long-term dependable fellowship. A high efficiency the polymorphic key exchange algorithm is proposed that is based on the polymorphic key exchange protocol. The identity information of two parties can be appended to the agreement. Both communication parties use their PRNGs to finish the polymorphic virtual S-box together. The security of the PRNG was analyzed by the Strict Avalanche Criterion and some experimental results. It was proposed that the polymorphic key exchange algorithm can become a broad agreement in irregular scenes.

Workplace Accidents in Finnish Manufacturing Maintenance

Janne Haatainen¹

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The aim of this paper is to present information about manufacturing maintenance related accidents and accident prevention. Accident data has been gathered using two Finnish national accident databases. Results of the study show, that during the years 2004-2007 7303 workplace accidents were registered and during the years 1995-2009 there were 23 fatal accidents in manufacturing maintenance work. After taking into account the statistical issues introduced in the paper, it can be estimated that over 2000 workplace accidents occur each year in manufacturing maintenance. Significant numbers of accidents were due to workers losing control of a machine/object/hand-held tool/means of transport, stepping on a sharp object or deviation by overflow/overturn/leak/flow/vaporization/emission. In addition accidents involving workers slipping, stumbling and falling were common, especially when looking at severe accident cases.

Orientation and Guidance of Temporary Agency Workers

Toni Hyttinen¹

¹Tampere University of Technology, Finland

Temporary agency work has grown rapidly in Europe in recent years. Good orientation and guidance are necessary for employees occupational safety and health. Specifically, orientation and guidance are important for agency workers who operate in changing environments and work tasks. The aim of this study was to collect information about the orientation and guidance of Finnish agency workers. The information was collected with a questionnaire devised for temporary agency workers. The study results show that the guidance of agency work user companies is often insufficient, specifically in matters concerning workers occupational health and safety. In the future, the reasons for the lack of guidance should be researched.

A Virtualization Approach for Distributed Resources Security in Network Manufacturing

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²Beihang University, China

Network manufacturing technology has proven an effective approach to achieving integration of the distributed manufacturing resources over Internet. The nature of high interoperability of network manufacturing results in a variety of security threats due to the ultimate dependence upon operating system. Virtualization technology, allowing a monitor and control layer running between operating system and underlying infrastructure, could provide a promising approach to the security issues. This paper presents a secure VM-based architecture designed to enhance distributed resources security in network manufacturing. The paper also gives an application example with Xen. The application example shows that the virtualization approach can provide an effective support for intrusion detection, malicious software defending, user identification and data protection by the way of reliable separation of operating system from physical resources through VMM hypervisors, and thus achieve efficient access control of distributed resources in network manufacturing.

Session	Safety, Security & Risk Management (3)
Date	9/12/2010
Time	15:30 - 17:15
Room	SICILY 2502
Chairs	Victor Esteves; Yifeng Yin

Safety Management Problems Encountered by Industrial Service Providers

Sanna Nenonen¹

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Companies operating in the industrial sector are increasingly outsource some of their operations to be carried out by provider companies. Outsourcing entails external workforce to workplaces and forms new kinds of work communities with complex relations between different performers. New operating environment introduces safety problems which are particularly difficult to manage for providers commonly operating with several customers in varying worksites. This paper discusses the results of a literature review focusing on safety management problems encountered by industrial service providers. The factors most commonly mentioned to be problems for service providers relate to safety ignoring tendering system, divergences in customers and worksites, time pressures, poor resources available for implementation of safety measures, unclear responsibilities, dangerous work tasks, inadequate communication and insufficiencies in hazard identification. Even though several problems have been identified the practical means presented to improve safety by the provider companies are still exiguous.

Necessary Insurance in the Service Business of the Manufacturing Industry

Juha Vasara¹

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Responsibility issues and responsibility distribution are creating confusion for customer and service provider companies. The companies need to cover damage caused to other parties, but the companies also want to avoid overlapping insurance. This paper presents the results of interviews concerning the most important insurance for companies providing industrial services for the manufacturing industry, the kind of co-operation concerning insurance between a service provider and a customer and what type of special requirements for working abroad requires insurance. As a result, the most types of important insurance are liability and property insurance. When operating abroad, e.g., travel, leisure time and extended accident insurance are important as well. Although there is a need for tighter co-operation related to insurance between the service provider and the customer, it may be considered as a principle that both parties should take out insurance for their own operations.

The Exploration of Instrument of Users' Privacy Concerns of Social Network Service

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With rapid spread of acceptance and usage of Social Network Service (SNS, e.g., Facebook, Renren, Myspace), concerns about online information privacy have arisen. This paper explores the instruments of users privacy concerns in the context of SNS. First, based on the relevant literature review, comparisons among four scales are discussed and necessities of new items are proposed. Then a pilot test with an open question is carried out collecting 28 samples through interviews. Several reliable and specific new items are added through qualitative content coding. And this is followed by an integrated questionnaire survey. Analyses of 115 respondents' data indicate that SNS user's concerns about privacy are covering a wider range than previous scales. Quantitative result illustrates the new items are acceptable. Finally requirement for further factor analysis is suggested.

A Reformed Lattice Gas Model and Its Application in the Simulation of Evacuation in Hospital Fire

Weili Zhang¹, Zhengyu Yao¹

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In order to provide the rescuing decision-maker with the optimal evacuation plan when hospital fire happens, so as to improve the rescuing capability, the evacuation process is divided into two sections which include rescue and evacuation. Taking factors of fire to in-patient department into account, combine the swarm behavior in fish school algorithm with Agent-based technology, a reformed lattice gas model is established. Ultimately with the help of simulation software Anylogic, on the basis of reformed lattice gas model the paper simulates the pedestrian evacuation and chase down a plan to solve during rescue. The simulation result indicated that the reformed lattice gas model can simulate the scene of evacuation in hospital fire realistically.

Carbon Capture and Geological Storage - Technologies, Risk Analysis and Prospects for Use in Brazil

Claudia Morgado¹, Victor Esteves¹

¹*Federal University of Rio de Janeiro, Brazil*

The burning of fossil fuels for electricity generation is now the main source of emissions of GreenHouse Gases (GHG). Moreover, during the extraction of oil and gas, an amount of CO₂ is carried to the surface, and released into the atmosphere. As the concentration of CO₂ in the pre-salt deposits is higher than in wells currently operated, emissions growth will occur not only by the expected growth in production volume. An alternative to prevent these releases is to reinject the carbon in the reservoir from which it was extracted or in other geological formations nearby. All stages of Carbon Capture and Geological Storage were analyzed from separation up to monitoring. The assessment of associated risks, as well as aspects of policy, regulation and prospects for use in Brazil was analyzed.

A Time-dependent Flow Model for Hazmat Transportation Routing

Hongmei Jia¹, Lin Zhang¹, Manzhen Duan¹, Gao Fu¹

¹*Hebei Polytechnic University, China*

A lot of researches have been achieved on Hazmat transportation routing problem in order to take into both transportation out-of-pocket expenses and risk-related costs which are viewed as static. In this work, we consider the following hazmat transportation problem: a given set of hazmat shipments has to be shipped over a road transportation network in order to transport a given amount of hazardous materials from specific origin points to specific destination points and guarantee the minimum distance between Hazmat shipments is satisfied at any time and provide a time-dependent programming formulation represents the decisions for hazmat transportation routing problem. Then we transform the problem into a set of time-dependent shortest path problems for each truck that are relatively easy to solve when isolated. We exploit this characteristic to propose a method and heuristic that solves the shortest path problems iteratively on modified/restricted graphs. The proposed time-dependent model and heuristic algorithm are experimented on real scenarios of a regional network.

Session	Project Management (2)
Date	9/12/2010
Time	11:00 - 12:30
Room	SICILY 2402
Chairs	Christina Chin May May; Hossam Ismail

An Iterative Backward/Forward Technique for the Scheduling of Resource-Constrained Projects within Microsoft Project

Norbert Trautmann¹, Philipp Baumann¹

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Microsoft Project is one of the most-widely used software packages for project management. For the scheduling of resource-constrained projects, the package applies a priority-based procedure using a specific schedule-generation scheme. This procedure performs relatively poor when compared against other software packages or state-of-the-art methods for resource-constrained project scheduling. In this paper, we present a scheduling heuristic for Microsoft Project which generates some initial schedules by sampling various priority rules, and improves each of these schedules by iterative backward-forward passes. In order to account for all types of temporal or calendar constraints available in Microsoft Project, the heuristic employs only Microsoft Project's specific schedule-generation scheme. Computational results for a set of 1320 projects from the standard test set PSPLIB indicate that the presented heuristic renders the resource-allocation capabilities of Microsoft Project comparable to those of the best-performing software packages.

Selecting Subcontractors in Projects Using a Multicriteria Group Decision Model

Luciana Alencar¹, Adiel Almeida¹

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Researchers and practitioners have taken an increasing interest in analyzing outsourcing, particularly with regard to selecting contracts. In several situations, there is more than one person who is in charge of decision processes related to outsourcing and the preferences of all those involved must be considered in an appropriate way. In this way, it is presented a model for selecting subcontractors with the use of multi-criteria group decision. An application in the context of construction companies illustrates the use of the model. In order to improve the performance and quality of construction projects, it is essential for contractors to select subcontractor companies in a structured way.

A IDEF0-Based Methodology for Project Reliability Assessment

Hossam Ismail¹, Mustafa Rashid¹, Ping Zhu¹, Jenny Poolton¹

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This paper builds on an approach developed by the authors for extending IDEF0 modelling to act as a process reliability assessment tool. By quantifying the quality of the activity inputs the approach is able to assess the quality of activity outputs. The paper addresses how this approach is applied at a higher level to represent existing project management frameworks to improve their applicability. Two of these are PRINCE2 which is widely adopted in the UK and the second is PEMBOK widely used in the USA. In this paper PRINCE2 is dealt with in detail while a recommendation for applying it to PEMBOOK is presented.

Understanding the Requirements for Project Management Maturity Models: Awareness of the ICT Industry in Malaysia

Roslan Jamaluddin¹, Christina May May Chin¹, Chan Wai Lee¹

¹University of Nottingham, Malaysia

Surveys reveal that the higher the organization project management maturity level is, the greater it enhances project performance. However it is vital to first understand the requirements of such a maturity model in the context of the target industry or sector. In this study, we aim to assess the current status of project management maturity model (PMMM) adoption in Malaysia's ICT industry as an initiative to conceptualize a model for use in the sector. An online survey was carried out to investigate the level of PMMM awareness, its extent of adoption or practices and its prerequisite requirements for use in the ICT industry. Based on our findings, a preliminary framework of the PMMM is proposed in our next phase of study.

Project Data Warehouse Management with Multivariate Analysis

Jui-Sheng Chou¹, Hsien-Cheng Tseng²

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Numerous studies have generated cost estimating relationships (CERs) for transportation projects via data analysis. Some studies collected data from databases, while others sourced data from conventional paper-based formats. When cost data were not in a consistent format, many studies failed to discuss the streamlining of pattern recognition. This work adopts a standard procedure for identifying CERs for transportation projects. A pavement maintenance and rehabilitation project type was selected as a case study for extracting data and concealed prediction rules. Linear and log-linear statistical approaches were employed to create optimal models. The resulting optimum estimation models via knowledge discovery in databases process can be then integrated into an expert system to facilitate information management and generate preliminary budgets for transportation agencies.

A Support Tool for Assessing the Impact of Design Changes During Built Environment Projects

Helen Hindmarch¹, Andrew Gale¹, Robert Harrison²

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Design changes, during the detailed design phase of built environment projects, can have a detrimental effect on a project's duration and/or cost and as such need to be managed effectively. Accurate impact assessments are required to make informed decisions of whether or not design changes should be implemented. However, change management best practices give little guidance about how to carry out impact assessments. Interviews within the case study company (Arup) identified a tendency to rely heavily on the personal experience of engineering and project management practitioners when making impact assessments. This research is concerned with mitigating the risks associated with practitioners making judgments disproportionate to the true impact of a design change.

A software support tool facilitating practitioners in making better informed impact assessments is proposed as a solution. The support tool incorporates design management and planning techniques and has been refined through a process of workshops with industry practitioners.

Session	Systems Modeling & Simulation (1)
Date	9/12/2010
Time	13:30 - 15:00
Room	SICILY 2402
Chairs	Szu Hui Ng; Young Chel Kwun

Interpreting the Out of Control Signals of the Generalized Variance |S| Control Chart

Gerardo Avendano¹, Francisco Aparisi², Jose Sanz²

¹EAN University, Colombia

²Polytechnic University of Valencia, Spain

Multivariate quality control charts have some advantages for monitoring more than one variable. Nevertheless, there are some disadvantages when multivariate schemes are employed. The main problem is how to interpret the out-of-control signal. For example, in the case of control charts designed to monitor the mean vector, the chart signals show that there is a shift in the vector, but no indication is given about the variables that have shifted. Generalized Variance |S| quality control chart is a very powerful way to detect small shifts in the mean vector. Unfortunately, there are no previous works about the interpretation of the out-of-control signal of this chart. In this paper neural networks are used to interpret the out-of-control signal of the Generalized Variance |S| Chart. The utilization of this neural network in the industry is very easy, thanks to the developed software.

Effect of Confidence Interval on Bottleneck Identification via Simulation

Chompoonoot Kasemset¹, Voratas Kachitvichyanukul²

¹Chiang Mai University, Thailand

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This paper presents the application of simulation-based procedure to identify bottleneck in a job-shop environment. Ten jobs ten machines job-shop problem (10x10 JSP) is used to test the simulation-based procedure for identifying the system bottleneck. The result from the case shows that the choice of confidence interval level (CL) used in throughput mean comparison has effect on the bottleneck selection. Two scenarios are presented with two different CL of throughput mean, 75% CL and 90% CL. The result from the experiment shows that when % CL is increased, the judgment of bottleneck identification can be changed. Thus, it is necessary to use appropriate number of replications to match with the required %CL used in the simulation. In general, more replications are necessary when higher percentage of confidence interval level is required.

Performance Evaluation of Adaptive Cellular Manufacturing System using Simulation

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In mid-volume, mid-variety production cellular manufacturing systems have many advantages compared to systems using process layout. But their performance superiority is found to diminish when the demand becomes unstable. Adaptive cellular systems are designed, specially for dynamic demands. Here, the performance of an adaptive cellular system is compared to that of a system using process layout, using simulation, when they execute production in a multi-period dynamic demand environment. It is found that the adaptive design, perform comparatively better than process layout in terms of reduced work-in-process inventory and manufacturing lead time. The managing of semi-finished parts at the end of a period, and the effort of relocation of machines after every period are the disadvantages of adaptive cellular systems.

Response-based Interactive Motion Generation

Xuelin Huang¹, Xiao Song¹, Guanghong Gong¹, Dongming Chen¹, Jiajia Li¹

¹Beihang University, China

We demonstrate a response-based motion generation system capable of naturally response to the external disturbance while tracking a reference motion. Our approach associates the data-driven motion synthesis technique with the response simulation result. For a rapid approximation of the character response, we introduce both the simplified joint model and skeleton model for simulation, and adopt forward dynamics to estimate the angle disturbances. We design a corresponding control mechanism for our skeleton model to balance against disturbance, using the adjustments of key joints' movement. According to the response simulation, a multi-resolution maximum a posteriori estimation is proposed to search for the matched parameters and principal component analysis based on our response motion database is used for the final motion synthesis. Results for following different reference motions in presence of a variety of disturbances are demonstrated. Our approach shows its advantage in rapid generation of interactive and natural-looking motion for character animation.

Application of Stochastic Approximation Methods for Stochastic Computer Models Calibration

Jun Yuan¹, Szu Hui Ng¹, Kwok-Leung Tsui²

¹National University of Singapore, Singapore

²Georgia Institute of Technology, United States

Computer models are widely used to simulate real processes. Within the computer model, there always exist some parameters which are unobservable in the real process but need to be specified in the model. The procedure to adjust these unknown parameters in order to fit the model to observed data and improve predictive capability is known as calibration. In this paper, we propose an effective and efficient algorithm based on the stochastic approximation approach for stochastic computer model calibration. We first demonstrate the feasibility of applying stochastic approximation to calibration and apply it to two stochastic simulation models. We compare our proposed SA approach to another direct calibration search method, the genetic algorithm. The results indicate that our proposed SA approach performs equally as well in terms of accuracy and significantly better in terms of computational search time.

Designing a Robust and Cost-Effective Screening Strategy for Diabetic Retinopathy Using Simulation Coupled with Design of Experiments

Irene Vidyanti¹, Shinyi Wu¹, Carl Kesselman¹

¹University of Southern California, United States

This paper demonstrates the use of Design of Experiments (DoE) coupled with simulation to design a robust and cost-effective intervention in a systematic way. DoE provides a simple and intuitive method to find the optimum settings of the input factors for the most cost-effective intervention. Moreover, DoE addresses the critique that health care simulations unrealistically assume ideal conditions in simulating the impact of a particular intervention by utilizing robust parameter design to find settings that make the intervention robust to variations, such as uncertainty in some input factors. Both the determination of the optimum input factor settings for the intervention as well as robust parameter design for interventions would be demonstrated here, using the design of Diabetic Retinopathy (DR) screening strategy as illustration. A Markov simulation with elements of screening strategy as input factors and cost as the response take the place of traditional experiments.

Session	Systems Modeling & Simulation (2)
Date	9/12/2010
Time	15:30 - 17:15
Room	SICILY 2402
Chairs	Gerardo Avendano; Chuang-Chun Chiou

Existence of Extremal Solutions for Impulsive Delay Fuzzy Differential Equations in (E_{N^n}, d_L)

Young Chel Kwun¹, Jeong Soon Kim¹, Ja Hong Koo¹, Jin Han Park²

¹Dong-A University, South Korea

²Pukyong National University, South Korea

In this paper, we study the existence of extremal solutions for impulsive delay fuzzy differential equations using monotone method in n -dimensional fuzzy vector space (E_{N^n}, d_L) . This is an extension of the result of R. Rodriguez-Lopez [1] to n -dimensional fuzzy vector space.

Analysis of Check-in Procedure Using Simulation: a Case Study

Maurizio Bevilacqua¹, Filippo Emanuele Ciarapica¹

¹Università Politecnica delle Marche, Italy

The aim of this work is to use simulation and queueing theory to analyze the current status of the check-in process in an airport and identifying ways to improve its performance. In applications involving stochastic events, demand cannot be determined explicitly beforehand. For those applications, computer simulation is often used to predict resource demands. Queueing results provided a first order of magnitude and an indication of results that one may expect. In the case study the simulation allowed the decision-maker to determine how many check-in counters and what management strategy should be allocated to each departure flight while providing passengers with sufficient quality of service. It was tested that a dedicated check-in for a specific set of flights should be preferred over a common check-in option.

Aeroengine Modules Performance Deterioration Modeling and Assessment

Rui Zhu¹, Dezhi Wu¹, Zhirong Liu¹, Xinye Wu¹, Yinbiao Guo¹

¹Xiamen University, China

For the engine modules performance deterioration and fault diagnostics, the modules operation contributions to engine parameters changes are analyzed to find the modules deterioration impact on parameters shifts to the EPR (Engine Pressure Ratio) based baselines optimally modeled by Quasi-Newton method. The modules performance assessment strategies for the engine type in this study are finally achieved through the WF-EGT, (N1-N2)-P25/P2, P3/P2-EGT linear correlation match and baseline deviation analysis and applied for verification.

Modified Max-Plus Linear Representation for Inserting Time Buffers

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¹Nagaoka University of Technology, Japan

²Yamanashi Eiwa College, Japan

The Max-Plus Linear (MPL) representation is known as a useful solution of scheduling problems for a class of discrete event systems. In such systems, an initial schedule is frequently changed due to unpredictable disturbances. On the other hand, the Critical Chain Project Management (CCPM) method is an effective management tool for protecting projects from delays. In view of this, we have proposed a method of applying the concepts in the CCPM framework to the MPL representation, to control undesirable state changes. In our previous method, several time buffers are virtually inserted as new processes to avoid delays. With this method, however, it is difficult to figure out the relationship between the original structure and the modified one after the CCPM has been applied. Hence this paper proposes a method for take into account time buffers without installing new virtual processes in the MPL-CCPM representation.

Impact of Bilateral Contracts on the Price Volatility in the Electricity Market

Guanli Wang¹, Hui-Chih Hung¹

¹National University of Singapore, Singapore

One of the evident consequences of the deregulation in electricity industry is the volatility of market clearing prices (MCP). In this paper, we use variance to measure this price volatility and propose supply function equilibria and Cournot models to characterize the impact of bilateral contracts on the variance of MCP. As the result, we show that bilateral contracts reduce the variance of MCP. Finally, a numerical study based on Singapore electricity market to support our models is presented.

Switched Hybrid Speed Control of Elastic Systems with Backlash

Muhammad Burhan Khan¹, Fahad Mumtaz Malik¹, Khalid Munawar¹

¹National University of Science and Technology, Pakistan

Backlash nonlinearity is caused by the gap in the mechanical transmission link, and it poses a problem whenever there is a speed and position mismatch between the driving and driven side. In this paper, switched hybrid approach has been adopted to model and control the systems with backlash nonlinearity. A switched hybrid system consists of multiple subsystems with a particular subsystem active at a time, as dictated by a switching function. A two mass system connected through a mechanical transmission link is modeled as switched hybrid system; and, a multiple model adaptive control scheme with fixed models has been suggested for speed control of the load, taking into account the backlash in the system. The advantages of the suggested technique are shown using simulations. The control strategy does not require a priori knowledge of size of backlash gap. The robustness of the suggested technique has also been simulated in the presence of disturbance torque and uncertain backlash size.

Link-16 Model Architecture for Multiple Nets Simulation in NS-2

Zhao-Xiong He¹, Xing Liu¹, Xue-Min Liu¹, Jinglun Zhou¹

¹National University of Defense Technology, China

In order to study the system performance of tactical data link under the multiple nets communication mode in practice, based on NS-2 (Network Simulation version 2), taking Link-16 as an example, a design of the Link-16 data link with multiple nets structure model is made. And the data link with multiple nets is simulated. The simulation result is given. And the effect of multiple nets to packet transmission delay and network throughput is analyzed.

Session	Poster Session 2
Date	9/12/2010
Time	All-Day Display
Room	SICILY 2501

Study on Comprehensive Evaluation for Small and Medium Enterprises in Supply Chain Finance

Ying Chen¹, Chen Hong¹
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Commercial banks provide financial services to enterprises, especially to small and medium enterprises (SME) in supply chain, to decrease transaction costs, to simplify the process of property shift, to create liquidity and to make settlements. Thus, the banks need scientific methods to choose proper SME to corporate with. This article creates a comprehensive evaluation index system from five aspects: financial analysis, customer service, internal management, expected development and cooperation. Then, the algorithm is wavelet network, which is an advanced method and fits for comprehensive evaluation to classify SME into quality enterprises and non-quality enterprises. This avoids artificial methods of calculating subjectively uncertainty and poor convergence, and therefore is more precise than BP nerve network.

Manufacturing Strategies in the Auto Industry in Brazil and Spain

Jose Salles¹, Milton Vieira Jr.¹, Rodrigo Vaz¹, Rosangela Vanalle¹
¹Noxe de Julho University, Brazil

The aim of this paper is to identify and to analyze the manufacturing strategies of two supply chains of the auto industry and the assemblers' influences on the other participants in each chain. Two plants of the same assembler, one in Brazil and the other in Spain and their suppliers, were analyzed, using questionnaires and interviews. It was observed that the competitive priorities of the suppliers are strongly conditioned to the strategy of the assembler, and the ordination of these priorities in the Brazilian case is different from that in the Spanish case. In Brazil and Spain the inter-business relationships are suffering a transition from mass production, with conflicting relationships supplier-automaker, to a relationship of larger cognitive density, characteristic of the presuppositions of organization of supplies based on the model flexible production or lean manufacturing.

A Fuzzy Integrated Vendor-Buyer Inventory Policy of Deteriorating Items Under Credibility Measure

Chien-Chung Lo¹
¹National United University, Taiwan

A collaborative ordering policy in a modern supply chain system not only minimizes the integrated joint cost but also benefits each channel member. In the replenishment policy, resource constraint in each channel member is very common. When customer demand in the supply chain is fuzzy uncertainty, these constraints and cost functions may be imprecise and vague. In this paper, we consider fuzzy market demand and develop an integrated vendor-buyer ordering policy of deteriorating item with fuzzy joint cost and fuzzy vendor's and buyer's average inventory investment constraints. Under the credibility of the vendor's and buyer's average inventory investment constraints achieving their respective given confidence level, we develop a fuzzy chance-constrained programming model to find the optimal collaborative ordering policy that can minimize joint cost at a given credibility. Fuzzy simulation, associated with differential evolution (DE) algorithm is used to find the optimal decisions. A numerical example is presented at the end of this paper.

Simulation Study of SCM-Related Factors on Retailer's Performance Using Structural Equation Model

Erkan Bayraktar¹, Chang-Ching Lin², Kazim Sari³
¹Bahcesehir University, Turkey
²Tamkang University, Taiwan
³Beykent University, Turkey

In this study, a two-level supply chain with linear demand and seasonal swings is simulated under varying operating situations in order to explore the relationships among bullwhip effect, lead time, forecast accuracy, seasonality, service levels and retailer's performance. Next, a series of univariate tests are undertaken to

identify the relationships among the simulation outputs. Based on a structural equation model (SEM), a research framework is developed and tested to provide a rigorous analysis for the casual links among the SCM-related variables and retailer's performance. When the ratio of backorder to holding cost is lower than 8, lead time would appear as the most significant factor influencing total inventory cost. However, when this ratio is higher than 8, both bullwhip ratio and lead time appear to be equally important factors in improving retailer's performance. Finally, the forecast accuracy was found to have a positive effect on reducing total inventory cost.

Implementing a Green Manufacturing System Based on a Novel Assessment Model

Chang-Lin Yang¹, Rong-Hwa Huang¹, Min-Sun Wuang¹, Yu-Chun Chen¹
¹Fu Jen Catholic University, Taiwan

This work describes a novel assessment model that evaluates key successful factors for implementing a green manufacturing system. The proposed model has three dimensions, i.e. green design, green manufacturing process, and green packaging. Ten strategic subjects and 68 assessment factors are established and revised based on expert opinions collected via a questionnaire. Based on the analytical network process (ANP), the weights of factors in each layer are then calculated and assessment models are constructed with applicable and valuable references.

An EMQ Model with Time-Varying Demand Over the Product Life Cycle

Kuei-Chen Chiu¹, Chun-Wu Yeh², Chih-Chiang Fang³
¹Hsing Kuo University of Management, Taiwan
²Kun Shan University, Taiwan
³Shu-Te University, Taiwan

The Economic Manufacturing Quantity (EMQ) problems that appear in the literature assume that the demand rate is a constant and then attempt to find the optimal production cycle. The assumption may be appropriate for everyday commodities with a stable demand rate but it is not suitable for technology or fashion products because their demand rate is not constant in the product life cycle. The demand rate for such products life cycle will gradually increase over time, reach a peak, and then decline. Therefore, the optimal lengths of each planning production cycle would be not equal, which means that the traditional EMQ model is not applicable in such situations. For better cost management, an alternative EMQ model is thus proposed in this study. The proposed model uses the diffusion model proposed by Bass (1969) to predict product demand rates over product life cycles to minimize the related inventory cost based. In addition, this research also analyzes the effect of different demand characteristics upon planning product life cycles.

Toward Managing Demand Variability by Neuro-fuzzy Approach

Wen-Pai Wang¹, Chun-Chih Chiu¹
¹National Chin-Yi University of Technology, Taiwan

Because of globalization, fast changes of technology and short life cycle of products, enhancing the accuracy of demand forecasts becomes one of the important issues for managers. The objective of this paper is to analyze and explore given data of orders using adaptive neuro-fuzzy inference system (ANFIS) and to draw up, by ANFIS learning mechanism, the relational rules from historical order data, whereby to construct the needed forecasting model, hoping to make accurate forecasts according to the demand variability. Afterward the proposed forecasting model is compared with the conventional regression analysis and back-propagation network to verify its feasibility and validity.

Reinforcement Learning Based Scheduling in Semiconductor Final Testing

Zhicong Zhang¹
¹Dongguan University of Technology, China

Semiconductor test scheduling problem is a variation of reentrant unrelated parallel machine problem considering multiple resources constraints, intricate {product, tester, kit, component} eligibility constraints, and sequence-dependant setup times, etc. A multi-step reinforcement learning (RL) algorithm called

Sarsa(Lambda,k) is proposed and applied to deal with it. Allowing enabler reconfiguration, the capacity of the test facility is expanded and scheduling optimization is performed at the component level. In order to apply Sarsa(Lambda,k), the scheduling problem is transformed into an RL problem by defining state representation, constructing actions and the reward function. Experiments show that Sarsa(Lambda,k) outperforms the scheduling method in industry and validate the effectiveness of Sarsa(Lambda,k) to solve the scheduling problem.

A Hybrid Ant Colony Optimization Method for Scheduling Batch Processing Machine in the Semiconductor Manufacturing

Chengtao Guo¹, Zhibin Jiang¹, Hongtao Hu¹

¹Shanghai Jiao Tong University, China

This paper proposes a hybrid ACO approach to minimize weighted tardiness for a batch-processing machine in diffusion area with incompatible jobs and dynamic arrival time. The method combines ACO algorithm and NACH (Next Arrival Control Heuristic) method, and also puts the batching and scheduling process together. The proposed method is validated and verified by extensive simulation experiments. The simulation results show that the proposed method is superior to the MCR (minimum cost rate) rule with smaller TWT.

Agent-Based Scheduling with a Learning Effect Model

C.Y. Lam¹, W.H. Ip¹, C.H. Wu¹, S.L. Chan¹

¹The Hong Kong Polytechnic University, Hong Kong

The learning effect from repeated processing of similar operations or jobs can greatly increase the processing efficiency as knowledge or experiences are gained from the processes of operations or jobs. In this paper, the scheduling problem is modeled and solved by using another domain perspective of the integrated agent-based approach with learning effect. In this approach, an agent-based scheduling environment with a learning effect scheduling agent is proposed. The modeling and development of the proposed agent-based scheduling environment and its learning effect scheduling agent are discussed. Learning effect concepts are applied to the environment and its agents, such that the feature of learning effect is included in the model. Throughout the autonomous computation nature of the learning effect scheduling agent in the agent-based scheduling environment, a feasible optimal schedule can be generated according to its algorithms and logical functions so as to minimize the total resource consumption with makespan constraint in the scheduling problem.

New High Performing Hybrid Particle Swarm Optimization for Permutation Flow Shop Scheduling Problem with Minimization of Makespan

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The well-known particle swarm optimization (PSO) proposed by Kennedy and Eberhart has been widely applied to the continuous optimal problems. However, it is still intractable to apply PSO to discrete optimization problems, such as permutation flow shop scheduling problems (PFSSP). In this paper, a new high performing metaheuristic algorithm hybridizing PSO with variable neighborhood search (VNS) is proposed to solve PFSSP with the objective of minimizing makespan. NEH heuristic has been adopted in the first step to generate good solutions in the initial population, and then PSO and VNS are hybridized to search for optimal or near-optimal solutions of the PFSSP. Two effective neighborhood structures concerned with characteristics of PFSSP have been adopted to enhance VNS's performance. Computational experiments have been conducted on benchmarks and comparison results with other existing algorithms show the efficiency of the proposed algorithm.

How Managerial Ties Influence Firm Performance in China: A Perspective of Sensemaking

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Managerial ties may have positive impact on firm performance. However, it's still unclear how managerial ties influence the decision-making of top managers and a firm performance. This article explores the relationship between managerial ties and firm

performance by introducing a mediator of managerial sensemaking based on a survey of 243 firms in China. The empirical results indicate that managerial ties with actors in both market and nonmarket environments have the same important positive impact on firms' performance. Furthermore, two types of managerial ties will help for strengthening their ability of sensemaking so as to improve firms' performance.

GenCos Decision-Making Constrained by Operational and Financial Requirements

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In the new power business, the goal of electric generation companies is to commit their services at profit. The committed services will determine the future cash flows and consequently financial performance. However, purely generation assets' cash flows are path-dependent, since the path dependency relies on operational generating units' constraints. This paper focuses on the GenCos' future cash revenue flows required to fulfill total costs and financial requirements. For simplicity's sake, the future cash flows are dependent on a single commodity, electric energy.

The Urban Bus Supplier Selection Aided by AHP and Additive Scoring Model

Tomasz Blaszczyk¹, Tomasz Wachowicz¹

¹Karol Adamiecki University of Economics, Poland

The Analytic Hierarchy Process is a proven and widely applied Multiple Criteria Decision Making method. In this paper we described an application of this approach to the problem of supplier selection in municipal bus transport company. The set of evaluation criteria included both quantitative and qualitative data bounded with financial, technical and political expectations. We investigated requirements of both company's managerial board and technical staff. The final decision in the described real-life case was made on the basis of law of public tenders restrictions. This paper describes the decision making procedure with tender results comparison and discussion. The aim of this research was to identify the preference structure of company's management board and technical staff and to collate this preferences with results of tender procedure.

The Applications of Maximal Covering Model in Typhoon Emergency Shelter Location Problem

Anping Pan¹

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Typhoon-induced disaster is one of the most important factors influencing the economic development in China. One facet of evacuation is the withdrawal or removal of persons from a stricken or threatened area. Another is the resettlement of the victims, or potential victims, and the provision of shelter and resources in the areas to which those residents are moved. Typhoon Emergency shelters are places for people to live temporarily when they can't live in their previous residence during typhoon disasters. The most important function in emergency management is that choosing the positions of emergency service facilities, hence the site selection decision-making that how to effectively configure and rational distribution of typhoon emergency shelters in rural areas is very important. This paper describes an integrated location-distribution model for coordinating logistics support and evacuation operations in disaster response activities. In risk mitigation studies for natural disasters, possible sites where these units can be situated are specified according to risk based rural structural analysis. Logistics coordination in disasters involves the selection of sites that result in maximum coverage of resettlement need in affected areas. A example is given to show how the proposed model can be used to optimize the locations of typhoon emergency shelters in coastal typhoon disaster areas.

Comparing Product Development Models to Identify Process Coverage and Current Gaps: A Literature Review

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This paper summarises international literature on product development from an engineering perspective to identify coverage and gaps in commonly used product development process models.

As a result, we find a heterogeneous landscape of models describing the process. A comparative framework illustrating the emphasis and the scope of product development process models from different perspectives has been derived for our approach. This framework helps researchers and developers to identify suitable procedures for their specific perspective. Accordingly we discovered three areas (product development management, simultaneous development and information management) which are so far underrepresented in product development process models.

Research on Integrated Modeling Method for Modular Fixture Based on OO Technology

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²Hebei Polytechnic University, China

Generally, computer-aided fixture design (CAFD) system is limited to a special CAD system and can not be used cross platforms. Object-oriented (OO) method is taken as a core, together with tabular layouts of article characteristics (TLAC) and XML to build an integrated model for modular fixture system. In the integrated model, every sub-model works together to realize the goal of CAFD system being used successfully to other CAD platforms or diverse systems, providing valuable information and methods for the similar problems.

Simulation and Experimental Verification of Linear Interpolation Cutter Path Error Produced by NC Servo Characteristics of Machining Center

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²Chongqing University, China

This paper proposes a simulation method for estimating the trajectory error of a linear interpolation cutter path due to the NC Acc/Dec motion around a connection point of two segments for a MC. The algorithm is very simple and efficient for simulation calculation and practical programming. The effectiveness of the method is also evidenced through a detailed comparison of the simulated cutter path with the measured ones under various motion conditions. As a useful tool, the method is applicable to before estimating the influence of the Acc/Dec procedure characteristics on cutter path accuracy or judging the cutting conditions for the machining purpose without performing an actual machining test on the MC.

A Comparative Study for Designing Cellular Manufacturing Systems with Assembly Aspects by a New Approach

Jamal Aliabadi¹, M.Bahador Aryanezhad¹, Reza Tavakkoli-Moghaddam²

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The Cellular Manufacturing Systems (CMS) design problem with presence of assembly operations; as in the real manufacturing environments, and so, because of the parent/child relationships for the final products, is very different to what it has been common in the literature. This paper describes the CMS design in above situation and shows its differences with common situation by comparative analysis. For this purpose, a new mathematical approach for modeling the CMS design problem is presented to surmount the drawbacks of similar researches and to fill the current gap. Then, the computational results by solving an illustrative example are evaluated and comparative outcomes are used to demonstrate the validity of proposed approach.

Prediction of State of User's Behavior Using Hidden Markov Model in Ubiquitous Home Network

Wonjoon Kang¹, Dongkyoo Shine¹, Dongil Shin¹

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In this paper, we used Hidden Markov prediction tools to predict the state of the behavior of users in a ubiquitous home network. The state of the user's behavior presents a change of interest in the action of the user. This paper proposes a weight (WEIGHT) for the level of interest in the behavior and the strength of the relation between the behavior and interest, which is the formulation of the user's interest in the human action. We investigate the feasibility of predicting the next state using the sequence of previously observed

states and the action type, and analyze the efficiency of the Hidden Markov Model (HMM). The prediction accuracy of the method is determined. It is found that, on average, the choice of training data leads to a prediction accuracy of 84.61%, while in some cases the accuracy is as high as 91.23%.

Study of the Terminal-Pair Reliability in Grid Networks

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In this paper, we study the terminal-pair reliability in grid networks. An area switched tactical communication system such as ATN (Army Tactical Network) involve large number of nodes, and of links. The resulting huge number of possible combinations of node and link failures make it difficult to perform quantitative analysis for system survivability assessments in terms of multi-hop connectivity, under jamming and physical attacks. We suggest an ATN Simulation Model (ATNSM) to overcome this difficulty for enumerating multi-hop routing successes to develop a lower bound on connectivity. The analysis techniques were exercised on an example ATN area coverage network model with 7x5 grid nodes under stress conditions.

An ADT Comprehensive Evaluation Method Based on Bayesian

Lizhi Wang¹, Tongmin Jiang¹, Xiaoyang Li², Jingrui Zhang¹

¹Beijing University of Aeronautics and Astronautics, China

²Beihang University, China

Accelerated degradation testing (ADT) is used to obtain performance parameter in a short time and extrapolate the lifetime and reliability of the products under normal operation conditions. However, sometimes the degradation information from ADT is not enough for the limited cost and time, and the evaluation accuracy of the lifetime and reliability would be low for it. To solve this problem, this paper presents an ADT comprehensive evaluation method based on Bayesian theory, and take super luminescent diode (SLD) as an example to explain the application of this method.

A Heuristic Approach for Transportation Planning Optimization in Container Yard

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This paper addressed the problem of container transportation planning in the export container yard. Previous studies of this problem have been limited in consideration of the relocation number only. However, crane operation consists of both trolley and spreader moves within the same bay. The number of relocation is not enough to be the best overall measurement for reducing the unproductive time. In the spirit of previous authors, an additional factor of crane cost is taken into consideration for blocks relocation problem (BRP) in this paper. Three heuristic rules including minimum basic relocation number, minimum crane costs and minimum relocation operation times are proposed for determining the storage location of relocated blocks. A filtered-beam-search heuristic algorithm is proposed and presented for BRP with crane costs. Computational results on small and large-size problem instances allow drawing conclusions about the effectiveness of the proposed method.

Alleviating Shaft Torsional Vibrations Caused by Electric Arc Furnaces for a Low Capacity Turbine Generator by Using a Flywheel Coupler

Whei Min Lin¹, Chia Chun Tsai¹, Chi Hsiang Lin², Ta Peng Tsao³

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The current unbalance produced by the EAF operations may induce the torsional vibrations on shafts of a small scale steam turbine generator nearby. The vibrations might not be ignored due to that the unbalance is severe and sustained. What's even worse, the vibrations might be significant if there are any vibration modes which frequencies are closed to the double system frequency. In this paper, turbine shafts vibrations induced by the EAF operations are analyzed by modeling and simulating a practical distribution system with the MATLAB PSB. Since it is the field measured

current data that are fed to the models, the time domain responses can be quite resemble to the real. Furthermore, we have designed a flywheel coupler, which can be quite effective in alleviating vibrations caused by the current unbalance.

A New Methodology to Integrate Human Factors Analysis and Classification System with Bayesian Network

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¹National University of Singapore & China University of Petroleum, Singapore

²National University of Singapore, Singapore

In this paper, a new methodology, which integrates human factors analysis and classification system (HFACS) with Bayesian Network (BN), is proposed to assess the contribution of human and organizational factors in maritime accidents. As a means of making up the lack of quantitative analysis within HFACS, the integration of BN and fuzzy analytical hierarchy process (AHP) have been selected to estimate quantitatively the contribution of human error to the accident. At the same time, the HFACS' 4-level structure provides a systematic guideline in the construction of the BN to model how human errors are related to form a network. Fuzzy AHP and decomposition method are applied to estimate the conditional probabilities of BN, which is more efficient manner and can reduce subjective biases. A case study of ship collision showed that the method is more flexible to seek out the critical latent human and organizational errors using the advantages of both techniques.

Effects of Psychological Empowerment on the Performance of R&D Employees: Moderating Effects of LOC

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To test the relationship between psychological empowerment and R&D employees' work performance (including task performance, contextual performance and innovation performance), and the moderating effect of Locus of Control, we collected paired data of 189 R&D employees and their supervisors from a large foreign-funded R&D institution in China. The results show that psychological empowerment has significant positive influence on R&D employees' task performance, contextual performance and innovation performance. In case of 'internals,' the impact of psychological empowerment on contextual and innovation performance is more significant than for 'externals.' The article concludes with a discussion of the theoretical values of this study, and its implications for managements in practice.

The Analysis and Design of Urban Bridge Safety Early-warning Management System

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In this paper, think of it in terms of safety science, it's pointed out that urban bridge safety early-warning system is mainly composed of four elements: human, bridge, environment and management, by summarizing the research status in the field of bridge security. Then primary configuration of early-warning management system for urban bridge is put forward, which is formed from four subsystems: human factor control subsystem, bridge condition monitoring and forecasting subsystem, bridge accidents emergency disposal subsystem and bridge safety early-warning management system. In order to keep bridge operating safe, enough attention should be given to the research of bridge techniques as well as the efficiency of bridge management. Improvement and supplement of early-warning management system for urban bridge must rely on the theory development and technology progress of safety science, along with accumulation and summary of safety management practices for bridge engineering.

Pavement Performance Evaluation Based on Entropy Weight Radar Chart Theory

Hongyun Yao¹, Rongjun Xing¹, Pai Xu¹

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After brief analysis of the current evaluation ways of the pavement performance, the integrated evaluation method of the pavement performance based on entropy weight radar chart theory is proposed in this study. In order to get objective, accurate evaluation results, after the analysis of radar chart theory and the improvement of the evaluation method of the traditional radar chart theory, a new evaluation method of the pavement

performance based on entropy weight radar chart theory is built. Finally, by practical application, the reliability of this method is verified, which provides the reference and basis for evaluating pavement performance accurately.

Development of an Explanatory Model of Cycles within Development Processes by Integrating Process and Context Perspective

Stefan Langer¹, Arne Herberg¹, Klaus Körber¹, Udo Lindemann¹

¹Technische Universität Muenchen, Germany

Dynamic changes and variations play a decisive role in innovation processes. By addressing the aspect of cycles – that is reoccurring temporal or structural patterns – within development processes as well as in their context, this research contributes to an enhanced understanding of complex dynamic interdependencies. Therefore, two development projects are analyzed and a series of interviews with industry is conducted, aiming at deriving examples of cycles from process execution. These examples are classified according to existing approaches for describing development processes and their context. Based on this, a definition of relevance of cycles is proposed and an explanatory model of cycles and interdependencies within the development process as well as in its context is presented. Finally, the modeling approach is reviewed concerning its benefits and its applicability.

Research on the Innovation BT Mode of Urban Rail Transit Projects Based on Project Control Right - A Case of Shenzhen Metro Line 5

Ling Yan¹, Yufei Zhao¹, Yaling Du¹

¹Tianjin University of Technology, China

The increasing demand of the Urban Rail Transit Projects (URTP) and the insufficiency of government financial capital make BT mode a better choice of financing and construction mode for infrastructure project. However, the co-organizer of the URTP under BT mode has the project control right during the construction period; while, the sponsor is not in charge of the project operation, which makes it difficult for the realization of the operation function. The paper takes Shenzhen Metro Line 5 as the example, analyzes the BT mode from the perspective of Project Control Right Allocation and points out the BT mode is a weak BT mode, that is, BT sponsor has strong control right during the operation and undertakes supervision responsibilities. The weak BT mode is an innovation mode on PCRA. It meets the management demands about operation function, reducing management interface and helping to transfer risks. At last, the paper analyzes the limitations of the innovation BT mode, which will help to explore certain value on theoretical study and practice of URTP BT mode.

Ideation for the Problem of Component Placing

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²University of Pennsylvania, United States

The component placing problem (CPP) is the problem of finding new uses of component, as distinct from final, products. This is an under-addressed and generally unsolved problem. It is especially important for firms that engage heavily in R&D and develop intellectual property. The literature on ideation and on new product development would suggest that nominal group processes could be useful in generating ideas for finding new uses of components. To our knowledge, this suggestion has not been taken up and reported on previously. We conducted three exploratory nominal group sessions, each tasked with finding new uses of Tyvek, a synthetic material produced by DuPont. This paper reports on the results, which were broadly promising.

An Automatic Ontology Building Method with Case-base in Semantic SOA Integrated System

Qicheng Zhang¹, Lin Zhang², Yongliang Luo¹, Baolu Wang¹

¹Beihang University, China

²Simulation Center, China

While ontology is critical to realize semantics, many defects exist in its building methods, especially conflicts between building cost and ontology quality. Specific to this problem, the paper brings forward an automatic ontology building method grounded on case-base. That is, to build domain ontology automatically with field concepts and relations extracted from case-base which records a plenty of users' domain knowledge and experience.

Firstly, the paper provides an in-depth study on theoretical analysis, which discusses its feasibility and effectiveness. Then, a system architecture and workflow are designed to adapt to the method. The last but not the least, combined with field characteristics of complex products' manufacturing process, algorithm and implementation concerning key technologies are comprehensively elaborated.

Embracing Open Innovation and Disruptive Innovation as Strategies for Chinese Companies

Jun Jin¹, Shanchao Wu¹, Aijun Ruan², Xiaomei Wang³

¹Zhejiang University, China

²Taizhou University, China

³Zhejiang Forestry College, China

Based on theoretical analyses of relationship of open innovation, disruptive innovation and competence building, this paper attempts to propose a conceptual framework for strategic making of Chinese companies to improve their competence and competitiveness combining open innovation and disruptive innovation. The growth of a company, R&V is taken as a case to illustrate this argument. Theoretical analyses and empirical research suggest that open innovation and disruptive innovation co-exist in a company. In addition, the research argues that open innovation and disruptive innovation can be strategies of a Chinese company to improve their competence. The research will contribute to the theories of open innovation and disruptive innovation and their practices in developing countries, like China.

Niche Strategy, Interfirm Network and Technological Innovation of Latecomer Firms: A Case from China

Lijuan Wu¹, Haiting Huang², Ju Li³, Xinmin Peng¹, Ruiqing Huang¹

¹Zhejiang Wanli University, China

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³Zhejiang University, China

Latecomer firms how to build the different interfirm network to match the different niche strategies to achieve better innovational performance is one of increasing concern topics both in practice and academics. The paper divides the niche into product niche and process niche, divides the technological innovation into product innovation and process innovation according to different competition positioning, through the case study of Yuren Group in China, we discovered the innovational mechanism that product niche contribute to product innovation and process niche contribute to process innovation, in which the interfirm network play an positive moderating role. This discovery put forward a revelation for latecomer firms to achieve successful technological catch-up.

University-Industry Cooperation and its Impact on the Innovation Performance of Firms in China: A Conceptual Model

Shichao Li¹, Jun Su¹

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This paper aims to extend our current understanding of how university-industry (UI) cooperation affects the innovation performance of firms. In particular, this paper develops a conceptual model to illustrate the cause-and-effect relationships between UI cooperative research and firms' innovation performance. In order to do so, first, relying on insights from the resource- and knowledge-based theories of the firm and the literature on relational embeddedness, we present a theoretical assumption of "the relational embeddedness of UI cooperation and firms' external knowledge acquisition and the innovation performance of firms". Then, we combine the results of prior studies on the above three aspects and the evidence from four theory-building case studies of Chinese UI cooperative research projects to formulate and verify a series of empirically testable research propositions, which therefore deepen and refine our knowledge of the above theoretical assumption.

Application of Digital Watermark Technology for Movie Data in Streaming Distribution Service

Manabu Hirakawa¹, Junichi Iijima¹

¹Tokyo Institute of Technology, Japan

Recently, business in digital content has grown at a rapid pace, and a variety of services and environments that carry music and video content have been established. Various distribution services, such

as DVD distribution and streaming distribution services over the Internet, have been started. Businesses that handle high-quality video are growing. However, these businesses are incurring increasing damages as a result of illegal copies, the quality of which does not deteriorate as the content is copied, owing to the nature of digitalization. The problems that accompany the evolution of digital technologies are some of the barriers impeding the solid growth of digital content businesses. Against this background, we investigate digital watermarking as a method for protecting for video content in this research, and we consider the related technologies and methods for implementing such watermarking. In order to compare digital watermarking technology with existing technology, we have divided the characteristics of digital watermarking technology into three elements. We discuss new concepts regarding each element and clarify its characteristics. We make a proposal for the copyright protection of digital content, and also propose how copyright protection can be applied in the service field.

An Objective Measure of Risk

Jiang Hong¹, Jian Zhai¹

¹Zhejiang University, China

In this paper, we develop a risk measure based on the concepts of "duality". The measure is defined on the domain of "gambles": random variables g with some negative values. It is positively homogeneous, continuous, subadditive, and respects first- and second-order stochastic dominance. Our measure is objective and gives extra weight to losses.

Engaging Employees in Organizational Commitment: The Training Quality in Industrial Management

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²National Changhua University of Education, Taiwan

This study aimed to discuss the relationship between innovative concepts of training quality and organizational commitment for Taiwan's industry management. Questionnaire survey was conducted on manufacturers in Taiwan that participated in the project of the Vocational Training Council. A total of 1000 questionnaires were distributed to directors, general employees, and human resource personnel in 100 industrial companies; and 66 valid samples from directors, 382 from general employees, and 123 from human resource personnel were returned, totally 571 valid samples. The data were analyzed by the structure equation modeling (SEM). Based on the results, the following conclusions are made: (1) an organizational scale of background variables has a significant effect on training quality, (2) different background variables have no significant effect on organizational commitment, and (3) training quality is significantly correlated to organizational commitment. The research results on innovation indicated that focus on training quality control is conducive to benefits of organizational commitment, and has a positive effect on organizational development.

The Moderator Role of Organizational Structure and Network on International Entrepreneurship: A Study of Chinese Firms

Hairu Yang¹

¹Shanghai Financial College, China

This study explores the role of a firm's external and internal factors in its acquisition of foreign knowledge. We hypothesized that international entrepreneurship is positively related to foreign knowledge acquisition. Furthermore, this relationship is moderated by factors including the organization's organic structure and network strength. Based on a sample of 219 Chinese international firms, our research results indicate that the organic structure positively moderates the relationship between international entrepreneurship and foreign knowledge acquisition. In contrast, the organization's network strength hinders the effectiveness of international entrepreneurship.

Cost of Quality Modeling: Extension and Improvement

Mohamed K. Omar¹, Sharmeeni Murugan¹, Nor Akramin Bin Mohamad¹,
Mohamad Razali¹

¹*University Technical Melaka, Malaysia*

This paper proposes a new cost of quality model that taken into consideration inspections errors, tolerance design and important process quality control techniques in a manufacturing environment. Through simulation works and using a real life data, the model was validated. Results indicate that the model accurately confirms the improvements suggested in the literature.

Internal Customer Orientation and Internal Supply Chain Management

Qionglei Yu¹, Yi Qiu¹, Wei Feng¹

¹*Zhejiang Gongshang University, China*

Internal customer orientation was initiated by the concept of internal marketing. The existence of internal market advocates the fact that internal customers can be motivated and satisfied by certain internal marketing programs. Companies with an internal customer orientation have more power in internal supply chain management and gaining better external market performance. This paper investigates how internal customer orientation can have positive impact on the company performance with an improvement of internal service quality. A conceptual framework is established and propositions are posited. Two cases are investigated. The research outcome shows a positive relationship between internal customer orientation and the effectiveness of internal supply chain management. Finally, management implications are recommended.

Customer-Supplier Relationship: a Multicases Study in the Brazilian Automotive Industry

Rosangela Vanalle¹, Alexandre Dias¹, Jose Salles¹

¹*Nove de Julho University, Brazil*

New forms of relationships and transactions are being practiced between companies participating in the same supply chain to improve the competitive conditions in the chain. The automotive industry is a striking example of a sector in which relationships between companies have undergone profound changes, motivated mainly by the influence of automakers on primary suppliers who, in turn, work with their own suppliers, forming a competitive alliance. This article discusses client-supplier relationships in Brazil's automotive industry, using case studies to ascertain the possible tendency for the formation of a new relational typology among these actors. Technical visits were made to fourteen auto parts suppliers to garner information about the main structural features and the relationship between automakers and suppliers. Interviews were held with top management staff in the areas of production, logistics and supply, product and process development, purchasing, and human resources. The findings indicated that the relationships depend on the supplier's institutional characteristics, the technological complexity of the components, the supplier's production capacity, and the history of client-supplier relations. It was concluded that the client-supplier relationships at the companies surveyed resemble the characteristics of an associative model, with contractual relations and high long-term interdependence, although price is still the main criterion that guides the automakers' choice of suppliers.

Session	Decision Analysis & Methods (7)
Date	10/12/2010
Time	09:00 - 10:30
Room	NAPLES 2703
Chairs	Hsiao-Min Chuang; Mohammed-Aminu Sanda

Oligarchic's Game Equilibrium Model in Regional Power Markets with Financial Options

Fang Wang¹

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Based on non-cooperative game theory, a Stackelberg model is developed for two plants in regional power markets. The plants are in the game of two-period in options and spot markets. By the backward induction method, equilibrium quantity of power generate of them in the spot market and call options they sell in the options market are solved. Different impacts of the financial options between the Stackelberg model and Cournot model on the market equilibrium and plant's bidding strategy are compared, and different impacts of the generating cost, strike price and spot price fluctuation on generators option trading strategy are analyzed. The results show that the financial options contracts promote the market competition to some extent, and the effect on power market according to Stackelberg model is greater than Cournot model, which provide a new idea for power to weaken monopolies and guide competition orderly.

Assignment Problem Formulation Under Competence and Preference Constraints

Raoudha Mkaouer Hachicha¹, El Mouloudi Dafaoui¹, Abderrahman El Mhamedi¹

¹*University of Paris 8, France*

In this paper, a new formulation of assignment problem taking into account both operator competences and individual preferences is presented. The integration of the aforementioned factors in the objective function of the proposed formulation is described. In the current work the dependence between competence and processing time is expressed by a coefficient that represents the degree of closeness between the required and acquired competence resources levels. Both, the calculation of the closeness coefficient and the structure of the processing time function are pointed up across the sections.

Selection of Construction Method for Large Section Soil Tunnel and Analysis of Monitoring Results During Construction Period

Ya Li Xu¹, Zeng Rong Liu¹, Quan Zhang²

¹*Xi'an University of Architecture and Technology, China*

²*Longyan Institute of Architectural Design and Research, China*

Relying on the background of large section soil tunnel engineering, the numerical simulation on three excavation methods for soil tunnel including bench method, arch heading method and cross diaphragm were carried out. Results show that the arch heading method is confirmed as optimum for this project by comparative analysis. And then, according to the monitoring results of the arch heading method, stress development laws and deformation characteristics of surrounding rock and supporting structure of large section soil tunnel were obtained, which include regression analysis functions of the development trend of vault settlement and horizontal convergence, distribution characteristics of ground surface settlement, development law of primary support stress and contact stress between surrounding rock and support, influence scope of tunnel face excavation and corresponding deformation law of surrounding rock as well as main deformation stage. Besides, the reliability of simulated results is verified by comparing them with the monitoring measurement data.

Classifying and Ranking DMUs of Different Efficiency Levels

Gongbing Bi¹, Linlin Zhang¹

¹*University of Science and Technology of China, China*

In this paper, we propose an alternative efficiency measurement to improve the insufficiency in Data Envelopment Analysis (DEA), provide a precise classification of efficient Decision Making Units (DMUs) and deliver more inner information about the evaluated DMUs, based on a new DEA non-traditional efficiency measurement which projects out DMUs at every input/output direction, one for each. Moreover, a procedure of three steps is given to differentiate the strongly efficient DMUs and weakly efficient DMUs among all the efficient reference sets. Finally, a numerical illustration is presented in this paper to show the potential advantages of the proposed DEA non-traditional efficiency measurement.

Modeling and Simulation of Operational Decisions in Manufacturing Enterprises Based on SD and BSC

Ying Yang¹

¹*Donghua University, China*

To get an integrated solution of operational decisions in manufacturing enterprise, this research firstly studies operational decision making process in manufacturing enterprise; it decomposes strategic visions based on BSC theory, and gets the decision targets and decision variables. The decision variables' value will change as the decision environments changed, and the decision variables relate to each other. This paper chooses SD method to establish an operational decision model; the model can simulate operational decisions in different environments and show the impacts on the key performance indicators of enterprise.

Session	Technology & Knowledge Management (7)
Date	10/12/2010
Time	11:00 - 12:30
Room	NAPLES 2703
Chairs	Prattana Punnakitikashem; Yuya Kajikawa

Technological Upgrading Path for Latecomer Firms in Global Value Chain: The Case of YOUNGOR from China

Xinmin Peng¹, Na Li¹, Changjuan Zheng¹, Lijuan Wu¹, Ruiqing Huang¹

¹Zhejiang Wanli University, China

The paper selected YOUNGOR Group as representation of latecomers in developing country to explore the technological upgrading path. By using case study methodology, the paper analyzed the relationships between technological innovation and enterprise upgrading among global apparel value chains which YOUNGOR embedded in. The paper summed up YOUNGOR's technological upgrading path which is from OEM to ODM to OBM. At the same time, fostering technological innovation capability and improving the lag link of the value chain, take vertical integration and brand marketing strategies simultaneously are the key elements to implement the upgrading path successfully.

The Role of Outbound-Revealing Open Innovation: Theoretical Extension and Case Study

Pengfei Wang¹, Yisha Zhou¹

¹Zhejiang University, China

Although open innovation has drawn more and more attention, the value of outbound-revealing is still mysterious and attractive, since firm could not see the direct benefits by revealing knowledge outside freely. By a mini case study of user innovation, we proposed that outbound-revealing would help firm achieve better inbound-sourcing, thereby to improve its innovation performance.

Visual Knowledge Service Market for Employment Information Grid

Chunlai Chai¹

¹Zhejiang GongShang University, China

More and more employment websites have provide recruitment services. Some of them are commercial websites, others are government-sponsored websites. The biggest problem for these centers is that there is no information sharing among these sites. This paper would assume each website as a knowledge or information node and analyze the possibility of knowledge sharing and the sharing architecture from the viewpoint of information sharing, then set up a virtual knowledge service market with rewards and punishments mechanism. Finally, through empirical experiment, the knowledge trading mechanism with rewards and punishments could significantly improve the knowledge efficiency.

The Representation and Analysis Methods of Domain Knowledge of Scientific Research Organization Based on Knowledge Network

Ruishen Chen¹, Haifeng Zhao¹, Guanwei Huang¹

¹Tongji University, China

The methodology of modeling and analyzing of a knowledge network are discussed in this article. Two steps will be taken to establish the model of a knowledge network for a scientific organization. Based on the network model, the density, betweenness centrality and structure expression analysis will be conducted. The calculation result of the density provides an objective indicator for the researchers to compare with two scientific organizations which are similar in scale. In addition, the betweenness centrality and the successive reduction method identify the level which determines whether the node is important or not. Furthermore, with the clique analysis and the hierarchy cluster method, we achieve the goal to express the structure of the network, which is critical for further study. At last, a numeric example based on the data from Shanghai Institution for Science of Science confirms the feasibility of the methodology of modeling and analysis.

Science and Technology Map Analysis of a Multi-Disciplinary Field Case Study of Aerospace Engineering

Hiroko Nakamura¹, Hajime Sasaki¹, Naoki Shibata¹, Yuya Kajikawa¹, Ichiro Sakata¹, Shinji Suzuki¹

¹The University of Tokyo, Japan

Both the expansion of knowledge and the fragmentation of disciplines are causing delay in important development strategy decision in many promising industries. Policy makers and practitioners expect tools to structure the expanding knowledge and to roadmap for breakthroughs. In this paper, we approach this challenge with a citation network analysis to academic publications and patents. The case study is discussed within one of the most complex galaxy of disciplines, Aerospace Engineering (AE). The analysis is based both on academic papers of major AE journals and on patents classified to AE by International Patent Classification. We obtained landscapes both of science and technology. We found the difference between knowledge structure of AE, an integrated multi-technology system and the results obtained from our previous studies in component technology fields. This study contributes toward developing the adaptability of our tool to roadmap for innovation.

The Role of Organizational Factors in the International Technology Transfer Project Success: An Empirical Investigation

Mohammadreza Taghva¹, Seyed Habibollah Tabatabaieian¹, Kamal Mohammadi¹

¹Allameh Tabatabaie University, Iran

The purpose of this study is to examine the effect of organizational factors on the success of international technology transfer (ITT) projects. To do so, three organizations involved in an ITT project are considered: the transferor, transferee, and project organizations. The results of the data from 47 ITT projects showed the significant role of transferee and project organizations in the success of ITT projects.

Session	Intelligent Systems (1)
Date	10/12/2010
Time	09:00 - 10:30
Room	NAPLES 2603
Chairs	Suthep Butdee; R. J. Kuo

Decision Making of Facility Locations Based on Fuzzy Probability Distribution Function

Pei-Chun Lin¹, Shuming Wang², Junzo Watada¹

¹Waseda University, Japan

Facility locations can appear to be a challenge for both novice and experienced analysts. But, it is far more efficient if its decision making follows a logical, systematic procedure. Such an approach markedly increases the chances of finding a location and improves the firm's objectives. This paper aims to provide Fuzzy Probability Distribution Functions (FPDF) so that the decision making can be pursued under hybrid uncertainty. FPDF is defined using three parameters of central point, right radius and left radius. Moreover, a new fuzzy probability distribution function is defined on the basis of these three parameters. When FPDF are properly generated, the functions can easily be used in the decision making of facility locations by means of optimal model proposed in Shuming Wang, et al..

Predicting Customer-supplier Relationships Using Network-based Features

Junichiro Mori¹, Yuya Kajikawa¹, Ichiro Sakata¹, Hisashi Kashima¹

¹The University of Tokyo, Japan

Business development is vital for any firms. However, globalization and the rapid development of technologies have made it difficult to find appropriate business partners such as suppliers, customers and outsources. In this contribution, we propose a new computational approach to find business partner candidates based on firm profiles and transactional relationships among them. We employ machine learning techniques to build prediction models of future customer-supplier relationships. We applied our approach to Japanese firms and compared our prediction results with the actual business data. The results showed that our approach successfully found plausible candidates, and can be a new powerful tool to develop one's own business in the complicated, specialized and rapidly changing business environments of recent years.

Using Constraints Filtering and Evolutionary Algorithms for Interactive Configuration and Planning

Paul Pitiot¹, Michel Aldanondo¹, Meriem Djefel², Elise Vareilles¹, Paul Gaborit¹, Thierry Coudert³

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This communication aims to associate the product configuration task with the planning of its production process in order to make consistent decisions while trying to minimize cost and cycle time. A two step approach is described with relevant aiding tools. During the first one, configuration and planning are considered as two constraint satisfaction problems and are interactively assisted by constraint propagation. The second one, thanks to a multi-criteria optimisation relying on a constrained evolutionary algorithm, proposes a set of solutions belonging to a Pareto front minimizing cost and cycle time to the user. After a problem introduction and a global description of the aiding system, the paper focuses on the optimisation process with interesting quantified results.

Decision Tree Based Demand Forecasts for Improving Inventory Performance

Pradip Kumar Bala¹

¹Xavier Institute of Management, Bhubaneswar, India

Demand forecasting with minimum error is the key to success in supply chain management. There is no dearth of techniques used for forecasting demand in retail sale. The advent of data mining systems gives rise to the use of business intelligence in various domains of retailing. The current paper makes an attempt to capture the knowledge of classification of the customers using decision tree as an input to the demand forecasting in retail sale. The paper suggests a model which has been used in retail sale for better forecasting of demands and improved performance of inventory in overall supply chain management. The proposed forecasting model with the inventory replenishment system results in the reduction of inventory level and increase in customer service level.

SVR Sagittal Balance of a Biped Robot Controlling the Torso and Ankle Joint Angles

J. P. Ferreira¹, Manuel Crisóstomo², António Coimbra²

¹Superior Institute of Engineering of Coimbra, Portugal

²University of Coimbra, Portugal

This paper describes the control of an autonomous biped robot that combines the use of the torso and the ankle joints movements for its sagittal balance. The innovative characteristic of this controller is the combined use of the ankle and torso joints movements to correct the Zero Moment Point (ZMP). It is used an artificial intelligence technique, the Support Vector Regression, to control the balance of the robot. To obtain a good stable step it is very important to have a good initial legs trajectory design. Having this in mind human-based trajectories were used, leading to smaller control corrections of ankle and torso joints. Different combinations of torso and ankle joints corrections were tested for the balance control on flat horizontal and inclined surfaces and the results presented. In order to evaluate and compare the performance of the balance control methods of a biped robot two performance indexes are proposed.

Fault Detection Methods for Reconfigurable Manipulators Via Decentralized Adaptive Fuzzy Nonlinear Observer

Peng Lu¹, Bo Zhao¹, Yuanchun Li¹

¹Jilin University, China

In this paper, a decentralized adaptive fuzzy nonlinear observer is proposed for fault detection of reconfigurable manipulators. Estimation error is obtained from measured and observed velocity is used as the residual vector, the system is fault-free operation when residual vector is smaller than the selected threshold value. A fault is declared if the residual vector is greater than or equal to threshold, the threshold can be set based on the various trials conducted in absence of faults. The fuzzy logic systems are proposed for approximating unknown terms dynamic model of subsystem and interconnection term by using adaptive algorithm. With simulation, the effectiveness of the design technique is illustrated.

Session	Intelligent Systems (2)
Date	10/12/2010
Time	11:00 - 12:30
Room	NAPLES 2603
Chairs	Manuel Crisóstomo; Ichiro Sakata

Composite Orthonormal Basis for Person-Independent Facial Expression Recognition

Wenfei Gu¹, Y.V. Venkatesh¹, Cheng Xiang¹
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We propose a novel framework, involving a composite orthonormal basis (COB), for person-independent facial expression recognition from images. In combination with localized features, the new approach decouples expression from identity information as much as possible. Experimental results show that such an approach, when applied to wide-ranging databases, significantly improves expression recognition accuracy in comparison with the results in the literature. It can also be successfully generalized to cross-database expression recognition which is believed to be the first of its kind.

An Intelligent Approach of Obtaining Feasible Machining Methods and Their Selection Priorities Based on Features Using Neural Network

Guang Ru Hua¹, Qing Hui Dai¹
¹North China Electric Power University, China

To obtain all feasible machining methods and their quantitative selection priority, an intelligent making decision approach using back-propagation neural network is proposed. Uniform design method, which is adapted for the problem of multiple factors and multiple levels, is adopted to build representative sample sets for the network. The neural network is trained by an improved back-propagation algorithm which can adjust momentum factor and learning rate simultaneously. Linear regression analysis is utilized to test the trained network. A case study has been conducted to demonstrate the effectiveness of the proposed approach.

Mixed Signature Descriptor with Global Invariants for 3D Motion Trajectory Perception and Recognition

Jianyu Yang¹, Y. F. Li², Keyi Wang¹
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Motion perception and recognition by trajectory are important for motion analysis. A flexible and adaptable descriptor of motion trajectory plays important role in the performance of perception and recognition. Motion trajectories usually use raw data for many tasks, which is not effective. Shape descriptors and signature of differential invariants are good for local features but global feature is lacking. In this paper, we present a mixed signature descriptor with global invariants which were not included in previous descriptors. The mixed signature is capable of capturing the global feature and is flexible in many tasks. The conducted experiments verified the capability of our method.

Body Sensor Network Based Prosthesis Training System for Leg-Amputees

Chenn-Jung Huang¹, Chin-Fa Lin¹, Po-Yen Tsai¹, Yu-Wu Wang¹, Ching-Yu Li¹, Heng-Ming Chen¹, Jia-Jian Liao²
¹National Dong Hua University, Taiwan
²National Taiwan University, Taiwan

In the past, the utilization of the limb prosthesis has improved the daily life of amputees or patients with movement disorders. However, a leg-amputee has to take a series of training after wearing a limb prosthesis, and the training results determine whether a patient can use the limb prosthesis correctly in her/his daily life. This work proposes a prosthesis training system to allow the amputees to train themselves. Instant feedback messages provided by the prosthesis training system are used to correct their walking postures during the self-training process. An embedded chip is used as a core to establish a body area sensor network for the prosthesis training system. RFID readers and tags are employed to acquire the 3D positioning information of the amputees limbs in this work to assist in diagnosing the amputees walking problem. The simulation results exhibit the effectiveness and practicability of the proposed prosthesis training system.

Algorithm of an Optimization Route for Collaborative 2 Swarm Robots

Suthep Butdee¹, Kritisak Tangchaidee¹
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This paper presents the algorithm of an optimization route for collaborative 2 swarm robots. The target is to pick up four blocks at given points randomly and bring them to the target places which are certainly assigned. The problem space is divided into two areas; inner and outer. The inner is defined as a square matrix of 6x6, whereas the outer is outside that area. The robots are started at inner space together with the four blocks. They have to work collaboratively in order to bring the blocks to the target places as fast as possible or the shortest distances. The algorithm is divided into two parts. One is used for individual robot control, whereas another is used for two robots' collaboration. The case study is tested on MATLAB.

Session	Engineering Economy & Cost Analysis (1)
Date	10/12/2010
Time	09:00 - 10:30
Room	NAPLES 2702
Chairs	Poul Kyvsgaard Hansen; Songlin Chen

Towards Customer Evaluation Based Product Performance Modeling

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¹Nanyang Technological University, Singapore

²Chung Ang University, South Korea

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In the front-end customer driven design process, a number of design alternatives need to be evaluated based on customer expectations. A systematic method is presented in this paper to rank design alternatives by formulating a future rating model. Projections to Latent Structures (PLS), which is a multivariate analysis technique with proven efficiency, is employed to model experts' ratings in terms of product attributes for each time step, and screen unimportant attributes using Variable Importance (VIP) Scores. The PLS model parameter time series is used to formulate the future rating model, by means of an optimization algorithm embedded with forecasting. A case study is conducted using ratings of 16 major mobile phone technological forums collected from 2006 first quarter to 2009 third quarter. The future model predictions of 2009 fourth quarter, with Mean Absolute Percentage Error (MAPE) of 1.6, show the potential of proposed concept screening method.

Synthesizing Judgment Matrix and Risk-odds Matrix for Small-sample Combined Forecasting

Li Xie¹, Ru-Xiang Wei¹, Da-Wei Zhang¹

¹Naval University of Engineering, China

There are some small-sample cases in economic forecast, for lacking of quantitative information, in which it happens that some given forecasting method fits well while behaves badly in forecasting, while to the contrary, the situation behaves well when we make the combination of both qualitative and quantitative method in forecasting. The concept of risk of forecasting is defined, as well as the concept and estimating method of risk-adds matrix. Then, taking the judgment matrix as the basic matrix and the risk-odds matrix as the adjustment one, the modeling strategy of forecasts combination which is obtained by dynamic synthesizing judgment matrix and risk-odds matrix is presented. In this strategy, as the mumble of samples changing, the advantages of both AHP and odds-matrix method can compensate each other, and the performance of small-sample combined forecasting can be improved.

Evaluation of TOU Price Based on Responses of Customer

Yu Cheng¹, Nana Zhai¹

¹North China Electric Power University, China

Time-of-use price (TOU price) based on demand response can change consumer's electricity characteristic. TOU price's effect relies on peak and valley periods division and determination of relative price. Evaluating current TOU price and investigating consumer's response for integration resources of user side dynamically and roundly. Quantized metastasis of electric quantity coefficient and quantized metastasis of electric quantity matrix are put forward in this paper. Based on this, quantized metastasis of electric quantity index is picked up by analyzing consumer's load characteristic which includes inspecting load rate and peak-valley ratio as well as integrating electric quantity's change of each period after execution of TOU price. Large industrial consumer response in some area evaluated by the frame of evaluation of TOU price is shown finally.

Analogy in Contemporary Engineering Economy: Mortgage Loan and Bond Pricing

Kai Lam¹

¹The Chinese University of Hong Kong, China

Two topics of social relevance, mortgage loan and bond pricing, have not received sufficient attention in engineering economy, though they are of considerable importance in real estate and corporate finance. In this paper we discuss some fundamentals for both topics using the basic TVM (Time-Value-Money) and NPV (Net-Present-Value) principles, and derive the closed form equations and iterative forms and their equivalence. Drawing upon an analogy between the computations for mortgage and bond, we apply cognitive modeling for problem solving using a financial calculator as an effective engineering tool.

A New Approach to Improve Functionality for Cost Reduction in Construction Project

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This paper summarized and reviewed the current main strategies for cost reduction in construction projects. According to the feedback from ten experienced construction managers, we analyzed the implementation of the current main strategies and nine possible factors (reasons) that should influence these strategies. Then a new approach is introduced to improve functionality for cost reduction in construction projects.

Session	Engineering Economy & Cost Analysis (2)
Date	10/12/2010
Time	11:00 - 12:30
Room	NAPLES 2702
Chairs	Kai Lam; Jean-Jacques Chanaron

Life Cycle Costing Analysis for Poly-Silicon Photovoltaics Production Processes in Japan

Toshihiro Inoue¹, Yuya Kajikawa¹, Koichi Yamada¹

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The objective of this study is to identify the key technology with analysis of the cost boundary of future photovoltaics (PV) technologies using life-cycle costing. We estimate the amount cost of photovoltaic system in Japan. It considers material flows over the whole production process starting from silica extraction to the final panel assembling. The comparison of current scenario to the expected future PV technologies focusing on the devices in each production processes results in plant scale boundaries.

An Extended Pricing Model for Wireless Oligopolies

Hailing Zhu¹, Andre L Nel¹, Wimpie Clarke¹

¹*University of Johannesburg, South Africa*

In this paper, we study price competition among multiple wireless service providers (WSPs) and propose a pricing model for such wireless oligopolies. In such oligopolies, each WSP has to compete with other WSPs for users while maximizing its profit. On the other hand, price- and congestion-sensitive users aim to maximize their compensated utilities by choosing a WSP offering the best QoS and price combination. Using a two-stage non-cooperative game model, we present a framework to formulate the interactions among the WSPs and the users and identify Nash equilibrium prices. We analyze the existence and uniqueness of equilibrium of this pricing game and characterize the relations of the WSPs' equilibrium prices. Analysis also shows that the equilibrium prices of the existing WSPs are sensitive to the entry of a new WSP.

Particle Swarm Optimization Algorithm for Optimization of Utility Systems in Chemical Processes

Wenzhi Dai¹, Lin Mu², Hongchao Yin², Wei-Haur Lam²

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²*Dalian University of Technology, China*

Different techniques for the optimization of utility systems have been developed in recent decades. The objective of this paper is to introduce a new mathematical programming model applied to the operational optimization for the utility system. Particle Swarm Optimization (PSO) presented by Kennedy has been described for solving mixed integer linear programming (MILP). It is a simple algorithm that seems to be effective for optimizing a wide range of functions, which a few parameters can be implemented easily. The case of utility system for the chemical process is also formulated as a MILP model where the mass and energy balances, the operational status of each unit, and the demand satisfaction of steam and electricity are defined. The target of the model is to minimize the utility costs. Current results are proved to be reliable, which implied that the current method is more effective and robust compared to the conventional method.

Thermoeconomics Cost Modeling of Marine Gas Turbine Generating Unit

Youhong Yu¹, F.R Sun¹

¹*Naval University of Engineering, China*

The thermoeconomics costs model of a marine gas turbine generating unit is built applying modern thermoeconomics theory. The effects of equipment investment costs, and fuel prices, operating and maintenance costs, finance interest rate, annual operating hours and water washing mean duration on thermoeconomics costs are researched. The results can provide science reference for Marine Integrated Full Electric Propulsion System prime movers arrangement and optimization.

New Service Development Success Factors: A Managerial Perspective

Dayu Jin¹, Kah-Hin Chai¹, Kay Chuan Tan¹

¹*National University of Singapore, Singapore*

Identifying key NSD success factors has long been a hot topic in NSD research. However, NSD success factor studies are more descriptive than instructional. From a managerial perspective, we conclude that most NSD success factors identified so far relate to three NSD management processes: NSD process management, NSD knowledge management, and customer involvement.

Session	Production Planning & Control (5)
Date	10/12/2010
Time	09:00 - 10:30
Room	NAPLES 2602
Chairs	Jack Su; Radha Ramanan Thiyagarajan

The Impact of Product Proliferation in Reverse Supply Chain

Vincent Huang¹, Jack Su¹

¹National Tsing Hua University, Taiwan

In a highly competitive market, product variety is one of the most important competitive advantages. However, excessive product proliferation will hurt firm's profit. Hence, how to manage product variety to maximize profit becomes an important issue. In a closed-loop supply chain, product proliferation not only impacts the forward supply chain, but also the reverse one. Although increasing number of product types will satisfy customer's divers needs better, complexity of product recycling, remanufacturing, and resale process may erode firm's profit. In this research, we develop a mathematical model to analyze a capacitated reverse supply chain, consisting of single remanufacturer and multiple retailers. The closed-form solutions for optimal batch size and profit are found. The managerial insights regarding how number of products and other factors impact batch size and profit are discussed. In addition, the relationship between product proliferation and the choice of logistic strategies is also investigated.

Performance Evaluation of a Mixed-model Assembly Line with a Bypass Subline Under Line Stop Condition

Mitsutoshi Kojima¹, Kenichi Nakashima²

¹Nagoya Institute of Technology, Japan

²Kanagawa University, Japan

A mixed-model assembly line is designed for production of many products of small quantities. A bypass line is installed for absorbing the difference of man-hour between items to be assembled on the mixed-model assembly line. However, when the man-hour is greatly different among the product types, the variation of the working delay and advancement cannot be absorbed and the line stop occurs. In this research, the length of working area, the variation of working times and the capacity of the buffer of the line are considered and their influence on the work completion time and the line stop time is examined by simulation experiments.

Development of a Hybrid Model for Manufacturing Cell Formation Using Linguistic Theory

Nirjhar Roy¹

¹M.N. National Institute of Technology, India

This paper presents a new approach for solving cluster formation problems using a linguistic model. The method starts with a hierarchical model in deciding the number of clusters/ machine groups. The solution is further improved by utilizing a genetic algorithm with the objective of decreasing inter-cellular move in terms of bottleneck machines. A unique feature of the proposed method is that it recognizes the operations sequence of manufacturing the parts, specified in the process sheets. The concept of null machine is introduced in the linguistic model to calculate the dissimilarity index in the form of Levenshtein's distance. The model developed by the author can be utilized either for flow type or random job-shop type manufacturing shop, with the emphasis of minimizing the back tracking. Number of machine groups can be predefined in the model. The model has been utilized to partition realistic discrete manufacturing systems for which the machine part incidence matrix shows sparse density

Novel Approach for Balancing Manual Automobile Assembly Based on Genetic Algorithm

Qihua Tang¹, Zhonghua Xiao¹, Yanli Liang¹, Mingxing Deng¹, Zhongmin Xi²

¹Wuhan University of Science and Technology, China

²Technique Center of Dongfeng Peugeot Citroen Automobile Company, China

As one of the key technologies in production process scheduling, line balancing has played a decisive role in improving productivity and increasing utilization efficiency. In this work, a novel approach for balancing manual automobile assembly lines is proposed by a genetic algorithm based framework, where task sequence chromosomes are coded with satisfaction of precedence constraints and partitioned dynamically under the restricts of unidirectional stations on assembly line. Furthermore, the initial populations, chromosome selection schemes for next generation, crossover and mutation operators are improved subsequently and hence the assembly balancing problem can be solved to the optimality or near optimality. The computational studies and comparisons have proven the validity and feasibility of the proposed approach in automobile assembly production lines.

Multi-objective Particle Swarm Optimization with Negative Knowledge for U-shaped Assembly Line Worker Allocation Problems

Ronnachai Sirovetnukul¹, Parames Chutima²

¹Mahidol University, Thailand

²Chulalongkorn University, Thailand

A Single U-shaped Assembly Line (SUAL) is a type of Just-In-Time (JIT) production system where a variety of product models with similar product characteristics are assembled. Worker allocation to the SUAL is crucial to achieve the main benefits of JIT with the minimum of number of workers, equity of workload and the shortest walking time. A novel algorithm, named Particle Swarm Optimization with Negative Knowledge (PSONK), is proposed to find the Pareto-optimal solutions for SUAL worker allocation problems with from seven to two hundred and ninety-seven tasks. The performance of PSONK are compared with Non-dominated Sorting Genetic Algorithm-II (NSGA-II) against the measures of convergence, spread, ratio of Pareto-optimal solutions, and CPU time. PSONK outperforms NSGA-II for most performance measures.

Risk Analysis and Response for Flow Construction

Zhiyong Yang¹, Zhuofu Wang¹, Bingsheng Liu¹, Zurong Chen¹

¹Hohai University, China

The continuous operation mode of high equilibrium in the flow construction yields great benefits in lowering the cost and reducing the construction period as well as risks. The change of the construction period of any sub-construction will definitely exert a relatively great impact on the balanced construction of the project. Through the analysis of Monte Carlo simulation method (MC), the assurance degree of the total duration calculated by using the traditional method is extremely low; after considering the effect of several kinds of important risks during the flow construction, such as "Adverse Selection", "Student Syndrome" on the total construction duration, the assurance degree of the total duration goes to almost zero degrees. The measures for the corresponding risks are put forward and their effects are analyzed as well. After the corresponding measures are adopted, the assurance degree of the total duration of the project has been greatly increased.

Session	Systems Modeling & Simulation (3)
Date	10/12/2010
Time	11:00 - 12:30
Room	NAPLES 2602
Chairs	Young Chel Kwun; Dong Li

A Novel Compatible Runtime Infrastructure under Complex Environment

Yingchao Yue¹, Tiaoyuan Xiao¹, Wenhui Fan¹, Shucai Tang¹, Xin Chen¹
¹*Tsinghua University, China*

Originating in 1980s, distributed simulation has been turned out to be a powerful tool in scientific research, military simulation and training, complex product design and more other fields. However, new problems like limited computational capacity and heavy communication overhead exist as simulation modeling and computation develop. This paper concentrates on these problems, reviews related work, and proposes two novel ways to improve traditional RTI (runtime infrastructure) under new application scenarios (High performance cluster and reflective memory network). The proposed methods of combining software improvement and hardware enhancement are demonstrated to be effective and efficient.

A Reflective Memory Network Based Runtime Infrastructure

Xin Chen¹, Wenhui Fan¹, Yingchao Yue¹
¹*Tsinghua University, China*

In the current distributed simulation system, the real-time network transmission has becoming increasingly demanded. However, the traditional physical shared storage and LAN technology both have some limitations. This paper describes the reflective memory network technology and compares it with the traditional network transmission technology. In the High Level Architecture (HLA) applications, Most of the Runtime Infrastructure (RTI) using LAN cannot satisfy the needs of real-time; this paper puts forward new transmission architecture of RTI based on the reflective memory network which can meet the need of real-time.

A Performance Comparison between the Extended Kanban Control System (EKCS) and the Traditional Kanban Control System (TKCS)

Alvin Ang¹, Rajesh Piplani¹
¹*Nanyang Technological University, Singapore*

This paper studies the performance difference of the Extended Kanban Control System (EKCS) versus the Traditional Kanban Control System (TKCS). Simulations were run using Arena version 12 for different initial parameter settings and a performance conclusion done for the Key Performance Indicators (KPI), such as fill rate and total average inventory.

Production Simulation using a Distributed Node-Aware System

Haw-Ching Yang¹, Z.-B. Wang¹, J.-S. Peng¹
¹*National Kaohsiung First University of Science and Technology, Taiwan*

This study proposes a node-aware distributed simulation system to accelerate production simulation. To optimize the production simulation performance, this system proposes the performance survey module and the node invoking module based on a MapReduce parallel framework to dynamically invoke valuable nodes during simulation. The performance survey module periodically collects each node performance and ranks the nodes capability before simulation, and the node invoking module invokes and evaluates the best nodes from the available nodes according to survey and current performances for minimizing the overall simulation time. Experimental results indicate that when the simulation jobs were distributed to 6 nodes using the framework Hadoop, the average simulation time was reduced 62.3% of time using single node. Moreover, the mean simulation time was reduced 73.6% when the proposed modules were further applied.

CAD\CAM System for Formed Turning Tool Grinding

Wei He¹, Y. Q. Tan², Min Ren¹
¹*University of Electronic Science and Technology of China, China*
²*University of Jilin, China*

This paper presents the CNC grinding method of formed turning tool and introduces a CAD\CAM system for formed turning tool grinding. This system can design cutting edge curve, produce tool path, construct simulation geometry model, simulate grinding process, and finally verify generated tool path and produced formed turning tool.

A Decomposition Based Algorithm for the Scheduling Problem in Wafer Fabrication System

Hongtao Hu¹, Zhibin Jiang¹, Chengtao Guo¹, Ran Liu¹
¹*Shanghai Jiao Tong University, China*

A decomposition based scheduling strategy is proposed to cope with the complexity of wafer fabrication, such as multi-products, reentrant process flow and unrelated parallel machines. The strategy is composed of genetic algorithm and dynamic scheduling rules. First, bottlenecks are detected and classified based on the constraint weights which are decided by the sensitivity of the system performance to the machine's fluctuant availability. Second, a dynamic work in process (WIP) control strategy is used to determine the dispatching order by adjusting the deviation of the WIP levels to avoid the process fluctuation caused by unpredictable events. Third, a hybrid genetic algorithm (GA) is used to optimize the dispatching route of the lots. Finally, a simulation platform is developed to validate the effectiveness of the proposed method.

Session	Service Innovation & Management (4)
Date	10/12/2010
Time	09:00 - 10:30
Room	NAPLES 2701
Chairs	Bingwen Yan; Hongyi Sun

The Mediating Role of Incubator Capability for the Relationship between Incubator Resources and Incubator Performance

Yanjie Li¹, Dechang Lin¹, Hongwei Wang², Qiang Lu¹, Hong Yin¹

¹Shenzhen Graduate School, Harbin Institute of Technology, China

²Nanshan Technology Venture Service Center, China

This paper studies the mediating role of incubator capability for the relationship between incubator resources and incubator performance. To justify it, a survey is conducted with managers from 150 incubators in China. Three types of incubator resources influence the performance respectively through the same variable "incubator capability" but with different mediating effects.

Enhanced User Experience Design Based on User Behavior Data by Using Theory of Inventive Problem Solving

Song-Kyoo Kim¹

¹Samsung Electronics Co., Ltd, South Korea

The paper deals another practical TRIZ applications for information technologies that is similar with the previous adaptation. TRIZ (Teoriya Resheniya Izobretatelskikh Zadatch) that is also called TIPS (Theory of Inventive Problem Solving) is a methodology that is the practical innovation tool and the model-based technique for generating innovative ideas by Genrich Altshuller. In the other hand, recent trends of improving user experiences can make consumer electronics to have high performed features in simple way to access. The key idea of the enhanced user experience is behavior analysis based on the typical statistical data that can be gathering during the regular user operations. This new user interface enhancing technology is designed to give simpler user experiences by using TRIZ method.

Towards a Knowledge-based Taxonomy for Value Creation Patterns in Professional Service Firms: Cases of Law Firms in People's Republic of China

Jiang Wei¹, Jiangqi Zhao¹, Yang Liu¹

¹Zhejiang University, China

After the transition from service economy to knowledge economy started, scholars pay more attention to professional service firms (PSFs) which are knowledge intensive, low capital intensive and organized by professors [1]. Some researchers focus on the important change of value creation patterns in the "Big Four" from 1999 to 2001, But these researches can't explain how the knowledge is created differently. Based on four cases of law firms in People's Republic of China, this paper tries to classify the variety of value creation patterns in PSFs.

State Space Model Based Dimensional Errors Analysis for Rigid Part in Multistation Manufacturing Processes

Ying-xue Tong¹, Yan Wu¹, Bin-kuan Ma², Faping Zhang³, Jiping Lu³

¹Sha Shi University, China

²Information Center of Xi'an Dong Fang Group Co., Ltd, China

³Beijing Institute of Technology, China

Modeling of variation propagation in multistation machining process is one of the most important research fields. In this paper, a mathematic model to depict the part dimensional variation of the complex multistation manufacturing process is formulated. A linear state space dimensional propagation equation is established through kinematics analysis of the relationships among of locating parameter variation, locating datum variation, so the dimensional error accumulation and transformation within the multistation process are quantitatively described. A systematic procedure to build the model is presented, which enhances the way to determine the variation sources in complex machining systems. Finally, an industrial case of multistation machining part in one manufacturing shop is given to testify the validation and practicability of the method. The analytical model is essential to quality control and improvement for multistation systems in machining quality forecasting and design optimization.

Measuring After-sales Service Quality in Automobile Retail: an Application of the SERVQUAL Instruments

Bingwen Yan¹, Patrick McLaren¹

¹Cape Peninsula University of Technology, South Africa

This paper reports on a measurement of the service quality within a dealership in the Western Cape Province, South Africa. A case study was conducted at the unit using five dimensions of SERVQUAL to calculate the gap differences between customers' expectation and perception of staff from the dealership. Various interviews and a semi structured questionnaire were utilised to collect the data from the dealer and its customers. The study analysed the service expectations of the customers. A number of customers' expectations for service quality were applied. Finally, the dimensions of service quality were analysed through exploratory factor analysis. The results of the study showed that service quality at the dealer does not meet the expected standard and that relationship between customer expectation and staff perception requires attention. Basically, there are also a number of considerable issues which would form the basis for useful further research.

Quality Function Deployment of Cement Industry in Pakistan

Khazal Dar¹, Muhammad Usama Shairi¹, Muhammad Asim²

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²Center for Advance Studies in Engineering, Pakistan

This paper aims to provide the quality function deployment of the cement industry of Pakistan. The data was primarily collected from the customers, competitors and company's higher authorities through a questionnaire. For this purpose, different industrial sites all across Pakistan were visited. The result showed that Fauji Cement Company Limited (FCCL) has an esteemed place in the cement industry of Pakistan with some room for improvement in the private sector. The data collected showed that customers require good quality and strength with nominal prices. This analysis signifies what different customers want and also what they look for in any cement industry.

Session	Operations Research (4)
Date	10/12/2010
Time	11:00 - 12:30
Room	NAPLES 2701
Chairs	Rashed Sahraeian; Xiaoming Liu

A Multi-Period Return-Risk Measure Portfolio Optimization Problem Incorporating Risk Strategies

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²Mississippi State University, United States

³Nanjing University of Technology, China

This paper proposes a stochastic program for the portfolio optimization problem over multiple periods. In addition to expected returns, the model considers various risk strategies for an investor, including short-term and long-term risk controls. The model could serve as a tool to quantify the impact of different risk control strategies and allow the investor to limit her risk-aversion periodically or for the whole investment horizon. Experiments are conducted to numerically show how the model could be used and to investigate the impact of different risk control strategies.

A Nested Genetic Optimization Algorithm for the Capacitated Facility Location Problem

Shan Huen Huang¹, Pei Chun Lin², Hou Ip Chan²

¹National Kaohsiung First University of Science and Technology, Taiwan

²National Cheng Kung University, Taiwan

This paper examines an integrated model to determine strategic capacitated facility locations based on the view of distribution center management in the upstream supply chain. The model incorporates the sub-problems of service flag allocation and vehicle dispatching allocation. This paper proposes a heuristic nested genetic algorithm which minimizes the total cost while incorporating consideration of the vehicle drivers' working time limitations. Additionally, an experimental application is also applied to examine the efficiency of the proposed algorithm.

A Weighting Scheme and a Model for Computing Alternative Pareto Optimal Solutions of Multi Objective Linear Programming Problems

Yashar Maali¹, Nezam Mahdavi-Amiri²

¹University of Technology, Sydney, Australia

²Sharif University of Technology, Iran

A new weighted order scheme is presented for finding alternative Pareto optimal solution of multi objective linear programming problems. In developing the weighted scheme, a big "M" model is proposed. We establish some properties of the ordering scheme and the proposed model and show how to determine proper values of the parameter "M". Illustrative examples are worked out to show the effectiveness of the proposed approach and the competitiveness of the obtained solutions as compared to the ones obtained by the weighted maxmin and the weighted aggregation methods.

Evaluation of the Solution for an Optimal Shelf Allocation for SPA Retailers

Takuya Suganuma¹, Hiroyuki Goto¹

¹Nagaoka University of Technology, Japan

This paper examines the accuracy of the solution based on a previous method for determining optimal display quantities in shelf space for SPA (Specialty store retailer of Private label Apparel) retailers. Our previous method proposes analytical solutions for particular cases where there is a gap between the sum of the original demands and the available shelf space. In this paper, we inspect the precision of the analytical solutions for general cases. By computing numerical solutions, we compare the results of the two methods. If the analytical solutions have higher accuracy for general cases, optimal display quantities can be obtained only with a small number of parameters.

NonLinear Quintic Schrodinger Equations with Complex Initial Conditions, Limited Time Response

Magdy El Tawil¹, Hanafy El Zoheiry¹, Sherif E. Nasr²

¹Cairo University, Egypt

²Fayoum University, Egypt

In this paper, a perturbing nonlinear quintic Schrodinger equation is studied under limited time interval, complex initial conditions and zero Neumann conditions. The perturbation and Picard approximation methods together with the eigenfunction expansion and variational parameters methods are used to introduce an approximate solution for the perturbative nonlinear case for which a power series solution is proved to exist. Using Mathematica, the solution algorithm is tested through computing the possible orders of approximations. The method of solution is illustrated through case studies and figures.

Scheduling and Planning the Outbound Baggage Process at International Airports

Markus Frey¹, Christian Artigues², Rainer Kolisch¹, Pierre Lopez²

¹Technische Universität München, Germany

²Université de Toulouse, France

The scheduling of outbound baggage at international airports is a challenging tasks in the airport industry. The issue is to control the incoming baggage flow in order to balance the workload over the system. The resource consumption of the different activities, which have to be scheduled, are depending on the arrival process of the baggage. Because of high complexity we suggest a decomposition heuristic to tackle this problem.

Session	Quality Control & Management (4)
Date	10/12/2010
Time	09:00 - 10:30
Room	NAPLES 2601
Chairs	Caiwen Zhang; Shaoyi Wang

Quality Control via Simplex Search-Based Model Free Optimization for Injection Molding

Xiangsong Kong¹, Zhijiang Shao¹, Xi Chen¹

¹Zhejiang University, China

Injection molding is an iterative manufacturing process entailing low operational costs. Quality control plays an important role in this process. To improve the efficiency of quality control measures, we propose a model-free optimization (MFO) method as a replacement for traditional model-based techniques. The simplex search method is incorporated in the MFO, and part weight and dimension are separately used as quality indices. Efficient performance is verified by a number of demonstrative experiments on an industrial injection molding machine.

Generic Compliance Check Tool in Examining the Conformity of Company-Specific Standards to Public Standards

Karen Tso-Sutter¹, Lars Karg¹

¹SAP Research, Germany

Compliance to standards has always been an important topic in quality management. It is the job of quality engineers to assure that their organization complies with public standards and is prepared for future developments. However, the quality models underlying company-specific and public standards are typically complex and not necessarily homogeneous. Analyzing and visualizing the conformity of a company-specific standard to a public standard is a challenging task. In this paper, we propose a generic compliance check tool to support quality engineers of various industrial domains in this challenge.

Applying Fast Fourier Transform (FFT) to Statistic Quality Control

Youxiang Cui¹, Jianxin You¹, Feng Luo¹

¹Tongji University, China

This article presents a FFT method in statistic quality control. Most previous statistic quality control tools can not analysis the quality data in both time and frequency. In this paper, the FFT method is used to transforming our view of the quality signal from time-based to frequency-based, to provide a basis for current decision during production as to when to hunt for cause of variation and take action intend to correct them, and when to leave a process alone. In spite of the apparent simplicity of the using FFT, the enterprise involved in trying to manage and improve quality find that it use calls for an entirely new point of view. The article conclusion proved by a practical example.

SWOT Analysis and the Key Driving Factors as an Indicator of the Current Situation of CNG Industry of Pakistan

Sahar Tanveer¹, Muhammad Asim²

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²Center for Advance Studies in Engineering, Pakistan

This paper proposes that SWOT Analysis on a selected sample, along with the analysis of Key driving factors of an industry can lead to the indication of the level of growth in that industry. A sample from the CNG Industry in Pakistan has been analyzed in this research on the above-mentioned methods and it has been found that there are some Weaknesses and Threats which can be neutralized by exploiting the available Opportunities. The paper also presents a collective Strategy for not only the CNG Industry of Pakistan but also for other industries in South Asia.

An Evaluation of the Relationship Between Emotional Labor and Volunteers' Positive Affective Delivery: In Non-Profit Organizations in Taiwan

Chen-Yang Shih¹, PeiWen Liao¹, Chung-Hsiung Fang¹

¹National Taiwan Normal University, Taiwan

The study used questionnaire survey research to examine the relationships among service training (ST), the frequency of contacting difficult customers (FQ), emotional labor (EL) and positive affective delivery (PAD) using a sample of 184 first line volunteers, and the response rate was 77%. The results revealed that service training (ST) influenced emotional labor (EL) positively; frequency of contacting difficult customers (FQ) affected emotional labor (EL) negatively; emotional labor (EL) has a positive effect on volunteers' positive affective delivery (PAD). The study discusses the implications for theory and practices. The results also suggest that focusing on developing human resource strategies for volunteers could enhance understanding of how volunteers manage their emotions on duty and suggestions for the further studies.

Multistage Process Monitoring Using Survival Analysis Regression Models

Shervin Asadzadeh¹, Abdollah Aghaie¹, Yaser Samimi¹

¹K.N. Toosi University of Technology, Iran

In this paper, we consider the monitoring of a multistage process in which the outgoing quality attribute is a reliability-related characteristic. To measure the tensile strength of such quality characteristics, the process output is commonly inspected under limited load conditions. As a result, we may encounter censored observations which demand a certain monitoring procedure. The monitoring scheme becomes more complicated when the censoring occurs due to variable competing risks as well. To address this critical issue, we propose a regression-adjusted CUSUM chart to effectively monitor a quality characteristic that may be right censored because of both fixed and variable competing risks. The result of a simulation study confirms the superiority of the proposed method in comparison with the existing one. The proposed control chart is applicable not only to reliability measures in manufacturing processes but also to similar quality indices in service operations such as survivability measures in healthcare services.

Session	Eco-system and New Business Model
Date	10/12/2010
Time	11:00 - 12:30
Room	NAPLES 2601
Chairs	Qiang Lu; Yongjiang Shi

Illustrating the Concept of Business Ecosystem from Views of Bionics and Competitive Network and Related Theories

Jie Hou¹, Qiang Lu¹, Yongjiang Shi², Ke Rong²

¹Shenzhen Graduate School, Harbin Institute of Technology, China

²University of Cambridge, United Kingdom

In this paper we illustrate the concept of business ecosystem by comparing it with other related concepts from the views of bionics and competitive network, involving theories of social Darwinism, general system theory, organizational ecology, value chain/network, industrial cluster and strategic alliance. This is aiming to better understand a business ecosystem and its applied advantage. The key point is: Business ecosystem is a good metaphor to demonstrate the growth and development path - birth, evolution, mutation and others forms for adapting to the environmental changes. The discussion is given followed by implications for future research direction.

Critical Factors for Technology Roadmapping: Case Studies

Jie Hou¹, Qiang Lu¹, Yongjiang Shi², Ke Rong², Qun Lei³

¹Shenzhen Graduate School, Harbin Institute of Technology, China

²University of Cambridge, United Kingdom

³Han's Laser Company, China

Through exploratory case studies, this paper identifies the critical factors for technology roadmapping in Chinese companies, and develops a framework with the relationships between these factors. This provides a "roadmap" for strategic technology and product planning.

From Value Chain, Supply Network, Towards Business Ecosystem (BE): Evaluating the BE Concept's Implications to Emerging Industrial Demand

Ke Rong¹, Jie Hou², Yongjiang Shi¹, Qiang Lu²

¹University of Cambridge, United Kingdom

²Shenzhen Graduate School, Harbin Institute of Technology, China

Two industrial challenges of uncertainty and interoperability arose as the new forms of industries structure have emerged. Network theories are systematically reviewed in three streams of network structure, network strategy and network evolution in order to find out the current theories' contribution on those two challenging issues, which include supply chain management (SCM), business network (BN), global manufacturing virtual networks (GMVN), strategic alliance (SA), open innovation (OI), industry cluster and industrial organization (IO). Furthermore, this study also explores their theoretical relationships with business ecosystem in order to highlight the research value and gap of business ecosystem, with a novel framework of 6Cs: construct, configuration, context, capability, context, co-operation.

Renew Business Ecosystem: A Comparison Study between Traditional and Shanzhai network

Ke Rong¹, Yongjiang Shi¹

¹University of Cambridge, United Kingdom

This paper is to explore the companies' strategy on renewing the mature business ecosystem by comparing between traditional and Shanzhai network. This research started as reviewing companies' strategy over the industry maturity from three perspectives including technology oriented, innovation oriented and network oriented. Then case study method is selected to demonstrate the detail renewal process of business ecosystem. Two groups of units are to study: traditional mobile companies' network and Shanzhai network as a mature business ecosystem. Finally, this paper is to identify five network strategies to renew the mature business ecosystem including easy solution, platform enabling, downstream innovation, organization recentralization and regulation adaptation.

Shanzhai (山寨) Manufacturing and its Network Behaviors

Yongjiang Shi¹, Ke Rong¹

¹University of Cambridge, United Kingdom

The aim of this paper is to explore an indigenous innovation phenomenon – Shanzhai Phenomenon – emerged in Chinese mobile phone industry, and to understand its network based behaviours. Although the Shanzhai Phenomenon emerged from the end of 2008, the detailed understandings about its systems and operational mechanism are still very limited. This research provides a very early stage of observation, especially focused on the business networks activities featured within the Shanzhai phenomenon.

A New Operations Model of Logistics Service Providers: Evidence from EA Company

Xiaoling Zhang¹, Qiang Lu¹, Cai Wen Zhang²

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²Sun Yat-sen University, China

With a trend of supply chain integration (SCI) on the one hand and more use of logistics service providers (LSPs) on the other hand, supply chain service provider (SCSP) is emerging for higher degree of integration and optimization of the whole chain. In this paper, we first develop the concept of SCSP based on literature review, and then conduct a case study (EA Company, a successful SCSP in China) to illustrate the operations model of SCSP. The proposed operations model consists of six dimensions: (1) horizontal and vertical integration; (2) non-asset-based; (3) charge mode; (4) information technology; (5) finance support; and (6) brand effect. These dimensions can differentiate SCSP from traditional LSPs.

Session	Reliability & Maintenance Engineering (2)
Date	10/12/2010
Time	09:00 - 10:30
Room	SICILY 2502
Chairs	Zhixin Yang; Young C. Park

Recent Trends in Systems Performance Monitoring & Failure Diagnosis

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¹Caledonian College of Engineering, Oman

²COMADEM International, United Kingdom

Modern engineering systems are becoming increasingly complex, sophisticated, demanding and globally distributed. Maintaining and sustaining such systems healthy, reliably, safely wherever and whenever needed efficiently and economically is a challenging task facing the 21st century. It is gratifying to note that significant advances are being made by researchers from academia, public and private R & D establishments, hardware/software vending organizations, professional and ISO to resolve a number of problem areas facing industrial sectors in maintaining their valuable assets. This paper presents some of the recent trends in the fast-growing holistic, proactive-based and topical area of systems performance monitoring and failure diagnosis.

Energy Consumption Modeling for Machine Tools After Preventive Maintenance

Jihong Yan¹, Dingguo Hua¹

¹Harbin Institute of Technology, China

Energy consumption of a machine tool increases dramatically as reliability decreases, which indicates performance degradation. From the perspective of near-zero downtime and energy conservation, preventive maintenance is usually carried out. This research aims at modeling the energy consumption of machine tools after they are maintained preventively. The relationship between reliability and energy consumption is modeled based on historical data and then the energy consumption of a machine tool is calculated. Reliability is modeled by Weibull distribution, the parameters of which are estimated utilizing the Maximum Likelihood Estimation method. Reliability after preventive maintenance is modeled by employing Malik's Proportional Age Reduction model. The carbon emission is assessed referring to the standard developed by the Climate Registry in North America.

Reliability Optimization Model of Standby Phased-mission Systems Based on BDD

Tao Hu¹, Jian Yu¹, Jian-Jun Yang¹, Ming-en Sheng²

¹Naval University of Engineering, China

²Naval 702 Factory, China

Phased-mission system is a kind of broad exist complex system. It has important reference value to research the reliability optimization of this kind of system. For reliability optimization problem of standby phased-mission systems, a method adopts modular fault tree and modular BDD to describe structure of standby system is proposed. The reliability compute method of standby sub-system in phased-mission systems is given, and put forward reliability compute model of the whole standby phased-mission systems. Based on this, taken mini-cost as objective to build reliability optimization model of standby phased-mission systems, and used particle swarm optimization to solve the model. The case validates the model's rationality and the arithmetic's validity.

Boundary-approaching Particle Swarm Optimization in Reliability-based Design Optimization

I-Tung Yang¹, Yi-Hung Hsieh¹

¹National Taiwan University of Science and Technology, Taiwan

The purpose of reliability-based design optimization (RBDO) is to find a balanced design that is not only economical but also reliable in the presence of uncertainty. Practical applications of RBDO involve discrete design variables, which are selected from commercially available lists, and non-smooth (non-differentiable) performance functions. The proposed PSO algorithm extends standard PSO to include a new feature: boundary-approaching. The proposed boundary-approaching PSO algorithm (B-PSO) is used to find the optimal design of a ten-bar truss, whose component sizes are selected from commercial standards, while reliability constraints are imposed by the current design code. In multiple trials, the B-PSO algorithm is able to deliver competitive solutions with consistency.

An Imperfect Process Strategy for a Repairable Product with Production Correction and Maintenance

Gwo-Liang Liao¹, Yar-Tin Chang², Bor-Ling Shaw³, Hung Yu Huang¹

¹National Taitung University, Taiwan

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In imperfect production processes, this paper considers production correction and maintenance to break away out of control state. Production processes are classified into two types of state: one is the type I state (out-of-control state) and the other is the type II state (in-control state). The type I state involves adjustment of the production mechanism. Production correction is either imperfect; worsening a production system, or perfect, returning it to "in-control" conditions. After N type I states, the operating system must be maintained and returned to the beginning condition. At the beginning of the production of the each renewal cycle, the state of the process is not always to be restored to "in-control". The total cost until "in-control" state, is determined. The existence of a unique and finite optimal N for an imperfect process under certain reasonable conditions is shown. A numerical example is presented.

A General Framework to Make A Sequential Preventive Maintenances Decision Using Proportional Hazards Model (PHM)

Ping Jiang¹, Ming Zuo², Jae-Hak Lim³, Bo Guo¹

¹National University of Defense Technology, China

²University of Alberta, Canada

³Hanbat National University, South Korea

Preventive maintenance is required for many important systems as failure occurrence results in great loss. Therefore, a sequential preventive maintenance decision procedure is proposed to maintain the hazard rate below the predefined level. A scheduled replacement with lower cost than failure replacement is required after several preventive maintenance actions. The time points (durations) for preventive maintenance and the scheduled replacement is determined by a proportional hazards model (PHM). The number of preventive maintenance is determined by the ratio of the average cost over the average lifetime. A Weibull lifetime system with known parameters is illustrated to carry out the proposed preventive maintenance decision procedure.

Session	Reliability & Maintenance Engineering (3)
Date	10/12/2010
Time	11:00 - 12:30
Room	SICILY 2502
Chairs	Ramachandran K P; Mohammad AlDurgam

Reliability Model of Multiplatform Phased Mission System Based on CPN

Chun-Hui Yang¹, Jian-Jun Yang¹, Peng Dong¹, Ming Li²

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Sub systems of complex system or platforms under network centric warfare (NCW) condition are required to work collaboratively in order to achieve an overall mission objective. It is very difficult to model and analyze the reliability of this kind of multiplatform phased mission system (PMS). At first, this paper sums up the characters of multiplatform PMS, and then put forward the method of mission representation, which can translate the multiplatform PMS into a PMS with single platform. The simulation is the best way to research the mission reliability of multiplatform PMS after contrasted other analytic method. Colored Petri Nets (CPN) is used to constructing the 3 levels framework of simulation model of multiplatform PMS. By transferred the multiplatform PMS into the initial token of CPN model, the reusability is hugely improved. The CPN model is demonstrated and validated by a simple example.

Machine Condition Monitoring and Fault Diagnosis based on Support Vector Machine

Jianhua Zhong¹, Zhixin Yang¹, Seng Fat Wong¹

¹University of Macau, Macau

Machine monitoring and fault diagnosis has been proven to be a key technology preventing malfunction and failure of critical machinery. This paper proposes a fault diagnosis method based on feature extraction technique, distance evaluation technique, and especially the support vector machines (SVMs) ensemble. The methodology consists of three major processes. Firstly, the features of raw monitoring data are extracted through the wavelet packet transform (WPT), and reduce searching space via applying the proposed time-domain statistical features. Secondly, the compensation distance evaluation technique is applied to select optimized set of features through sensitivities ranking process. Finally, the selected features are input into the SVMs which could identify the prevailing faults of rotating machinery. The experiment study on gearbox shows that the SVMs based method could reliably recognize not only different faults styles and severities but also the compound faults in high accurate rate.

Improving Healthcare Reliability by Integrating Six-sigma in a Business Process Modeling and Analysis Strategy

Zied Ben Atallah¹, Amar Ramudhin¹

¹École de Technologie Supérieure, Canada

Six-sigma methodology provides real and concrete results in healthcare systems by mitigating and eliminating variations in critical processes. However, using Six-sigma alone in complex environments can lead to unproductive and inefficient work due to a misunderstanding of the process interactions. Combination of both business process modeling and six-sigma helps achieve a highly reliable, customer-oriented and process-based healthcare system. Business process modeling allows a deep understanding of complex care pathways and helps in identifying those pathways which are critical to the patient. Six-sigma methodology on the other hand helps to improve the reliability and minimize the risks in the critical patient pathways. While the literature is full of studies and examples of the individual techniques for improving healthcare services there is little evidence on the best way of combing these tools to accelerate improvement programs. This paper presents a framework which will provide guidance to healthcare organizations seeking a sustainable strategy for operational excellence with a high-level of process reliability by integrating both Six-sigma tools and a business process modeling technique.

Optimal Maintenance Policy for Three-States POMDP with Quality Measurement Errors

Mohammad AlDurgam¹, Salih O. Duffuaa¹

¹King Fahd University of Petroleum and Minerals, Saudi Arabia

Partially Observed Markov Decision Process (POMDP) has been used to model decision making under uncertainty in a wide spectrum of applications. A few areas of application include: manufacturing, healthcare, business and military applications. In the POMDP context, systems are considered as multi-state systems with hidden states. The common thing among all POMDP models is the existence of measurements utilized to infer about the actual hidden state of the system on hand. However, measurements, in general, are not error free. The impact of measurement errors on the POMDP optimal decision policies is formulated and studied for a three-state deteriorating machine with two quality outcomes and possible quality measurement errors. The decision making problem is modeled as a Three-Layers Hidden Markov Decision Process (TLHMDP). The objective function of the POMDP problem is shown to be a piecewise linear convex one. The impact of measurement errors in the POMDP context is demonstrated by numerical example.

Application of Accelerated Failure Model for Oil and Gas Industry in Arctic Region

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¹University of Tromsø, Norway

²University of Stavanger, Norway

The development of offshore energy resources involves highly complex and extensive technological processes. Therefore all relevant factors which can affect equipment performance and safety must be identified and quantified exactly. This is more critical when the design is going to be established for a new operational environment such as the Arctic region with new challenges. There are a few data and little experience available regarding operation equipment in the offshore oil and gas industry in the Arctic region. However, the oil and gas industry has established regular programs such as OREDA (Offshore Reliability Data), in order to collect reliability data. Using this type of data, collected from similar systems but under different operational environmental locations, in designing processes for the Arctic region may lead to incorrect design. This may increase risk with respect to Health, Safety and Environment (HSE) or/and increase costs. Therefore, the available data need to be considered according to the environment condition. According to the existing literature, an accelerated failure time (AFT) model is a useful approach in order to consider the effect of the operational environment on the performance of equipment. The aim of this paper is to develop a methodology in order to predict the reliability of equipment in the Arctic region using an accelerated failure time (AFT) model. An illustrative numerical example is used to demonstrate how the model can be applied in a real case.

Assurance Technologies for Electric Point Machine Controlled by Optical LAN

Yoshiyuki Hirano¹, Gen Kogure¹, Shinichi Ryoki¹, Tadao Miura¹, Takashi Kunifuji¹, Yuichiro Den¹

¹East Japan Railway Company, Japan

When an interlocking device is improved, a large number of signal cables have to be re-laid and wiring connections must be confirmed. There are possibilities of wiring errors in the improvement of the interlocking device. A railway signal control system using an optical LAN is developed for the purpose of reduction of signal cables and wiring work. This system controls signaling devices by transmitting digital information through an optical network, and it has a method of system configuration to make the system more flexible and secure.

In this paper, we introduce development of electric point machine controlled by Optical LAN, and describe assurance technologies used for this system.

Session	Global Manufacturing & Management (1)
Date	10/12/2010
Time	09:00 - 10:30
Room	SICILY 2402
Chairs	Yong-Zai Lu; Sue Morton

Implementation Framework for Collaboration in a Non-Hierarchical Business Network

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The growing trend of business collaboration exerts an extra pressure on global business communities. This collaboration can be evolved in the form of hierarchical and no-hierarchical. In this research, we have considered non-hierarchical collaboration, where manufacturing organizations especially small and medium enterprises (SMEs) enjoy equal power and freedom within their networks. In order to develop such a collaborative network, SMEs need to adopt different procedural steps such as build, qualify, form, operate and dissolve. In such circumstances, we have proposed an implementation framework or methodology in this article with the view to demonstrate the logical approaches to the formation of a virtual organization (VO) within a business community. The formation of this collaborative network is implemented for a complex engineer-to-order (ETO) product. The common goals and understanding of the successful non-hierarchical business collaborations and future research directions are also concluded within the scope of this paper.

The Investigation on Research Opportunities for the Applications of the Internet of Things in Semiconductor Wafer Fabrication

Yong-Zai Lu¹

¹Zhejiang University, China

Based on the state-of-the-art technologies of the Internet of Things (IOT) and Radio Frequency Identifier (RFID) this paper introduces the concepts of IOT/RFID and investigates its open research opportunity and potential applications in real-time monitoring and dispatch controls for semiconductor wafer fabrication (FAB).

Engineering Portal with Coordination Mechanism for Collaborative Product Development

Zhixin Yang¹, Jie Zhou¹

¹University of Macau, Macau

In nowadays, product development processes become very complicate in terms of product complexity, global manufacturing and management. Engineering portal, which integrates the distributed application servers in web environment, is proven to be able to support collaborative product development. This paper introduced a four-tiered client/server engineering portal architecture, which allows task analysis, data sharing, and collaboration among team members in an internet platform. A complex operation request could be decomposed into several discrete tasks, which could be partitioned into corresponding task groups with different internal interaction relationship via design structure matrix analysis method. The application tools are registered with the co-ordinator via establishment of registry. The association between tasks and application tools is managed by the proposed coordinate mechanism, which enable users to access the corresponding tools over internet. Manufacturing enterprises could therefore effectively collaborate with their partners global widely.

Analysis of Green Product Knowledge, Green Behavior and Green Consumers of Indonesian Students (Case Study for Universities in Surabaya)

Togar Panjaitan¹, I Nyoman Sutapa¹

¹Petra Christian University, Indonesia

Nowadays, environmental damages become hardly to be solved. It happened by many factors like lack of information about green products, human lifestyle that unaware or even don't care about the environment, and there' still paradigms that green product or green consumerism aligned with high cost. This study shows that students have sufficient knowledge related to green products. Green behavior of students is tends to improve by start from a simple things in their daily activities. In other hands, whenever decide to buy products; not all those students aware with green products in order to make them adopt green lifestyle. The students with high financial capability are more aware buy green products than others.

Job Characteristics, Work Commitments, and Job Satisfaction of the Thai Workers in Taiwan

PeiWen Liao¹, FurHsing Wen², Chin-Cheh Yu¹

¹National Taiwan Normal University, Taiwan

²Soochow University, Taiwan

This paper describes the variables of job characteristics, work commitments and job satisfaction. We studied 400 Thai employees in Taiwan. AB people are moderators, and that Type A people are easily irritated, highly competitive, and are always in a hurry. Job characteristics do not affect job satisfaction, but work commitments affect job satisfaction.

Flexible Management of Resource Service Composition in Cloud Manufacturing

Lin Zhang¹, Hua Guo¹, Fei Tao¹, Yongliang Luo¹, Nan Si¹

¹Beihang University, China

With the development of microelectronics, computer technology, information technology, and intelligent of machinery and control equipment, the flexible manufacturing technique has become one of the key developing directions for advanced manufacturing technology. The cloud manufacturing (CMfg), which is a new generation service-oriented networked manufacturing model, can provide the users distributed in different places with the manufacturing resource and manufacturing ability services through the centralized management. In order to improve the quality of resource service optimal-allocation and cope with the flexible issues in CMfg, this paper investigated the definition and classification of flexibility in the whole life-cycle of resource service composition in CMfg, and the related factors in life-cycle of resource service composition were analyzed. The flexible management architecture for resource service composition in CMfg was designed. The key issues and their solutions in flexible management of resource service composition were preliminarily discussed.

Session	Global Manufacturing & Management (2)
Date	10/12/2010
Time	11:00 - 12:30
Room	SICILY 2402
Chairs	Anil Varma; Ahm Shamsuzzoha

A Measure to Estimate the Novelty of Component Combinations in Technologies

Toru Takahashi¹, Tomoko Saiki¹

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We propose a measure to estimate the novelty of component combinations included in technologies. We used the International Patent Classification (IPC) included in patent publications as proxies of technology components. We analyzed the inventions related to photocatalysts of granted and rejected patent applications filed with the Japan Patent Office. We calculated the novelty of component combinations (NCC) value using IPCs. We conducted comparison studies of NCC values between patent publications before and after 1994, the year in which scientific phenomenon in photocatalysts was discovered, and those between granted and rejected patent applications. As a result, the NCC values of patent publications were demonstrated to be different before and after this discovery and also between granted and rejected inventions.

Green Manufacturing Using Integrated Decision Tools

Clifford Chan¹, K.M. Yu², K.L. Yung²

¹Queensland University of Technology, Australia

²Hong Kong Polytechnic University, Hong Kong

Manufacturers are now facing common problems of environmental impact from the local society, green regulation, green product and factory operation in developing countries like China. Water, noise and air pollutants are significantly environmental issues from arise not intense environmentally consciously manufacturing. This paper presents to use integrated decision tools to assist stakeholder to determine how to become green manufacturing. This research highlights the need for a more effective decision support tools that will collect data, analyze and provide solution to stakeholder. Overall, a variety of decision support system, expert system, and design for environment (DFE) methods are available; however they limited in their applications to solve green manufacturing problems. With the availability of faster and more user-friendly computers and sophisticated software, it has been possible to use simulation modeling to investigate the parameter effectively. Furthermore, this research will also be developed a measure of model to provide a unique framework for investigating the green manufacturing by integrated decision tools.

Partner Selection of Chinese Firms' in Cross-boarder M&A: Perspectives From Complementary Assets and Global Value Chain

Xiaobo Wu¹, Xi Yang¹

¹Zhejiang University, China

Choosing a target firm in M&A is always challenging, since it greatly affects post-acquiring performance. This paper analyzes three overseas M & A cases presented firms positioned in upstream, midstream and downstream sections of global value chain, the result showed each company have different focus while selecting target firms: technology-based enterprises which positioned in upstream of global value chain often emphasize on technology capability of the target company; firms in the midstream intend to expand to both ends of global value chain: technology and brand extension; occupied in downstream of global value chain often focus on marketing capabilities and brand influence.

Study on The Utility Model and Utility Equilibrium of Resource Service Transaction in Cloud Manufacturing

Ying Cheng¹, Fei Tao¹, Lin Zhang¹, G. H. Xi², D. Zhao³

¹Beihang University, China

²Wuhan University of Technology, China

³The University of Michigan-Dearborn, United States

As a new service-oriented network manufacturing model, cloud manufacturing (CMfg) can accelerate the transformation from production-oriented to service-oriented manufacturing. Study of resource service transaction (RST) is one of the key issues that deciding the practical application of CMfg. In this study, the comprehensive utility models considered the revenue, time, and reliability for the three sides, i.e., resource service provider (RSP), resource service demander (RSD), and resource service agent (Agent) in the RST process in CMfg under the decentralized decision-making condition are first established, respectively. Then the comprehensive utility model for the RST chain (RSTC) of "multiple RSP-one Agent-multiple RSD" under the centralized decision-making condition is proposed and discussed. The existence of utility equilibriums between RSP and Agent, Agent and RSD are proved in the optimal decision of the RSTC under the decentralized decision-making condition.

Multi-layer Analysis of Relationships within Production Networks: A Case Study of the Huangyan Mould Cluster in China

Lubin Wu¹, Yongyi Shou¹

¹Zhejiang University, China

A production network involves inter-firm cooperation within the manufacturing sector and gradually becomes the mainstream production mode nowadays. This paper explores a framework that combines the dimensions of network layers and relationship styles to better understand relationships in production networks. The Huangyan mould cluster is selected as a case and relationships between mould producers and other cluster players have been studied to test the proposed framework.

Session	Poster Session 3
Date	10/12/2010
Time	All-Day Display
Room	SICILY 2501

Elucidating the Supplier Integration Spectrum on Strategic Supplier Selection Problem Using an Integrated Fuzzy Approach

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²Tzu Chi College of Technology, Taiwan

The majority of the existing supplier selection (VS) approaches obtained their optimal solutions based on the operational metrics. This study considers the supplier integration spectrum (SIS) to secure the efficacy of VS. This work adopts supplier's process capability indices and process yields as operational (hygiene) criteria to estimate their quality capabilities. The business process-oriented criteria are employed as the strategic (motivation) criteria. A fuzzy approach with SIS consideration is employed to select supplier. An empirical case study is then performed to demonstrate the efficacy of the proposed system. The case study provides interesting managerial implications.

A System Dynamic Model for an Open-loop Reverse Logistic Channel

Chuang-Chun Chiou¹

¹Dayeh University, Taiwan

The purpose of this study is to analyze the external and internal factors influencing the system behaviors and the collection and remanufacturing capacity planning issues in an open-loop reverse logistic channel via a system dynamic model. The external factors include legislation (subsidy provided by the government), quality level of the used products collected, and the demand patterns of the secondary market; while the internal factors include the adjustment of the capacity of recovery facilities. The constructed system dynamic model can be effectively used to analyze and evaluate different policies which affect the capacity planning for the reverse logistics system.

Multiobjective Hybrid Genetic Algorithm for Reverse Logistics Network Design of Inventory Systems with Backordering

Jeong-Eun Lee¹, Kyong-Gu Rhee², Hee-Hyol Lee¹

¹Waseda University, Japan

²Donggeui University, South Korea

The reverse logistics is the process flow of used-products that are collected to be reproduced so that they can be sold again to customers after some processing. Within this perspective, we formulated a mathematical model of the reuse system as a reverse logistics with two objectives functions: one is minimizing cost of reverse logistics network problem, (i.e. transportation cost, disposal cost, purchase cost and inventory holding cost) another is just-in-time delivery, and minimizes the costs of backorders and inventories in manufacturer in all periods. This paper proposes a new multiobjective hybrid genetic algorithm approach, and shows how the performance of multiobjective genetic algorithm can be improved by hybridization with Fuzzy Logic Control (FLC). In the experimental results comparing CPLEX, pri-awGA (priority-based adaptive weight Genetic Algorithm) and mo-hGA (multiobjective Hybrid Genetic Algorithm), we demonstrated the effectiveness of mo-hGA such as shortness of computational time and better solutions.

Study of the Performance of Reverse Logistics for Supply Chain Management

Chia-Ching Tu¹, Shu Hsuan Chang¹, Chia-Jung Tu², Andrew C. H. Lee³

¹National Changhua University of Education, Taiwan

²Kainai University, Taiwan

³Chihlee Institute of Technology, Taiwan

Globalization enables many high-tech manufacturing firms to have more reverse logistics demand; reverse logistics is further complicated when operating in a multinational setting. High-tech manufacturing firms thus must have an adequately large in-house fleet size as well as warehousing and advanced IT management systems to accommodate this unpredictable and large demand in reverse logistics. This study focuses the role, challenges and management level of the case study company in the reverse logistics of the supply chain. Also, it reviews the performance and related data, and sets up the development strategy of the case study company of reverse logistics.

Clustering Spanish Households E-Waste Disposal Behavior Using Self-Organizing Feature Maps

Sebastián Lozano¹, Jorge Esparza¹, Belarmino Adenso-Díaz², José Manuel García¹

¹Universidad de Sevilla, Spain

²Universidad de Oviedo, Spain

In this paper a Self-Organizing Feature Map (SOFM) is used to identify clusters of similar respondents to a survey of Spanish households on their behavior and habits with respect to the End-of-Life of electric and electronic products. The survey covered six common appliances and included more than twenty questions regarding the number of units in use, duration of previous appliances, reasons for buying each new appliance, details of the handling of the discarded appliances, etc as well as information on socio-demographic factors of respondents. Since most of the questions were of a discrete type the answers needed a coding/pre-processing phase. The SOFM approach considered a rectangular grid and in the case of all six appliances identified five clusters of respondents whose characteristic features were analyzed from the cluster prototypes provided by the SOFM.

Measurement of the Integration Level of Supply Chain Based on Complex Network

Bo Shu¹, Hao Chen¹

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The paper introduced the complex network theory into supply chain research, and set up the model of the integration level of supply chain. Firstly, the paper looked back related researches about complex network and measurement of integration level of supply chain. Secondly, the paper put forward features of supply chain network: directed graph; nodes increased randomly but asymmetrically; and preferential attachment of nodes in locality. Thirdly, on the foundation of analyzing impact factors of supply chain complex network integration, built up evaluation model according to the statistics property of complex network, finally executed example calculation and conclusion.

Impact of Financial Crisis on Performance of Listed Logistics Companies: Evidence from China

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The financial crisis is presented around the world and has affected China economy indirectly. The objective of this article is to study the impact of the crisis on performance of listed logistics companies and finds out what field it affects. In this article, we take 64 listed transportation & warehousing companies as research objects. Applying factor analysis and Wilcoxon rank test, we find that the impact of financial crisis on performance of listed logistics companies does exist.

Optimizing Feeder Arrangement of a PCB Assembly Machine for Multiple Boards

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²The Hong Kong Polytechnic University, Hong Kong

In a high-mixed production environment, printed circuit board manufacturers face the challenge of frequent setups which involve rearranging the feeders on the machines. To reduce the setup cost, different boards can be assembled with a common feeder arrangement. This paper focuses on the optimization problems arising in this situation. Decisions are to be made on how different component feeders are arranged on the machine considering the structure of different boards, and the component placement sequence for each board. While the feeder arrangement problem and the placement sequencing problems can be solved iteratively for the sake of simplicity, these problems should be solved simultaneously so that an optimal solution can be found. This has been verified for the sequential pick-and-place machine by mathematical models established and computational experiments conducted in this research. Future research should incorporate different machine types and allow for feeder duplicates on the feeder carrier.

Study on Subsidy Policies of Waste Recycling

Tao Zhao¹, Mali Zong¹
¹Tianjin University, China

We analyze optimal recycling quantity of waste where production consisting of two modes of production, manufacturing with virgin material and with recycled material. We develop a differential dynamic model of recycling in which accumulated waste quantities depend on instantaneous waste disposed and waste degradation rate. We find that market demand increasing will lead to the increasing of accumulated waste quantities and recycling rate. Based on this conclusion, we propose subsidy policy instead of tax policy to stimulate firm to produce using recycled material. Two ways of granting subsidy have been studied in this paper, which is subsidy on remanufacture cost and subsidy on collection cost. Study result shows that the amount of subsidy on collection is only half of that on remanufacture under obtaining the same amount of accumulated waste.

Linguistic Set-Valued Decision Making Based on LWA Operator

Xuezheng Zhang¹, Qian Zhu¹, Zheng Pei¹
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In linguistic group decision analysis, we need to solve group decision making with uncertain linguistic information. By analyzing many illustrative example, we notice that not all of linguistic values of the initial linguistic expression domain are used to evaluate decision making problem. From the decision making point of view, linguistic values used by experts have priority over others linguistic values in evaluating results of alternatives. In this paper, we formalize the priority as priority weight vector of linguistic values, and propose a new linguistic weighted aggregation operator (LWA operator) to aggregate linguistic set-valued, in which, two weight vectors (weight vector of experts and priority weight vector of linguistic values) are considered in LWA operator, its properties show that LWA operator is generalization of many existed linguistic aggregation operator. By an illustrative example, we show that LWA operator can help us to gather more information to linguistic set-valued decision making.

Empirical Research on the Relationship between Managerial Ownership and Earnings Quality in China

Zhijun Zhang¹, Zushan Wang¹
¹Wuhan Institute of Technology, China

In order to research the relationship between managerial ownership and earnings quality in China, the article researches the financial data of Chinese listed firms by using the abnormal accrual model and adjusted Jones model, we find that managerial ownership influences earnings quality by firm's accounting choices. The empirical research shows that the distribution between of managerial ownership and earnings quality is a U-shaped curve, and concentrated managerial ownership is helpful to enhance the earnings quality.

Influence Factor Analysis of Product Development Process

Kunlun Zhang¹, Bo Guo¹
¹National University of Defense Technology, China

In the product development process considering design iteration, it's more difficult to reflect interrelationship between variables with simulation analysis. Especially there is no certain function expressing the effect of parameter interrelationship on the product development time. The existence of iteration complicates the structure of analytic model, and the metamodel can simplify the problem and reduce the costs. The paper analyzed the impact of the parameters on average completion time of product development in design structure maxim by building the metamodel, and identified the main impact factors.

Real-Time Scheduling Method for Steelmaking-Continuous Casting

Kai Chen¹, Zhong Zheng¹, Yi Liu¹, Xiaoqiang Gao¹
¹Chongqing University, China

In this paper a real-time scheduling method for steelmaking-continuous casting is proposed to improve the flexibility of scheduling. A directed network model is used to describe steelmaking-continuous casting process considering

status of workstations and logistics. First, disturbances including four major kinds are advanced to motivate real-time scheduling in steelmaking-continuous casting process. Second, rescheduling during production process is driven by disturbances mechanism and recalculated by backward and hybrid intelligent algorithm. A real-time scheduling system based on this method is established, and verified by a production plan of eight hours. The result shows that it's efficient to real plant production.

Effective Design of Production Systems

Vladimir Srajer¹, Antonin Miller¹
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At the present time, when the market is mostly saturated and supply is higher than demand, if a company wants to be successful it must find competitive advantages, such as low price, shortest delivery time and the required level of quality. One way of achieving these benefits is to find the best design for a manufacturing layout. This article contains proposition a modified procedure for the design of production systems, which shows the sequence of the steps which should be fellow by designer of the production system. This article is focused on problems of the acceptable proposition of the layout of production system in the terms of optimization material flows, balancing of resources and resources capacity.

A Comprehensive Assessment Method for Reliability Enhancement Testing Based on D-S Theory of Evidence

Junbo Wan¹, Tongmin Jiang¹, Xiaoyang Li¹, Xi Liu¹
¹Beihang University, China

In this paper the Dempster-Shafer theory of evidence is utilized in comprehensive assessment of the reliability enhancement testing (RET). The basic concept of the D-S theory and the rule of evidence-combination are introduced. Moreover, the approach to the assessment of the RET utilizing the D-S theory of evidence is presented. Firstly a recognition frame for all possible effects of RET programs on the product's reliability is established. Secondly every test program is regarded as a piece of evidence and the corresponding evidence body is set up. Finally all evidence is combined according to the D-S rule of combination. In addition, an example is presented to verify this method. It is proved that this approach should increase the accuracy of the comprehensive assessment of RET and may be useful in engineering.

Prediction of Service Life of Pre-stressed Concrete Bridge by Fault Tree Analysis Model

Xiongjun He¹, Phan Anh Nguyen¹
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"Fault Tree Analysis" uses the logical model and mapping methods to analyse, calculate or estimate the probability of phylogenetic. Thus, the reliability of the system, safety and risk could be assessed. They have been widely used in system's reliability study and to quantify the correlation of potential risk of the system. In the existing of reliability analysis, the time factor generally doesn't need to be taken into account. However, composition properties of the materials decrease would lead to the reduction of the level of structural reliability. Therefore, structure's reliability is actually an amount of time-varying. Comprehensive consideration of the above factors, the analysis of a variety of factors will impact on the service life of pre-stressed concrete girder bridge, to build bridge structure analysis model. From the calculation of timevarying structure system's reliability, the service life of bridge could be evaluated to find safety and reliability of structure.

Risk Evaluation of NC Machine Tools Based on Fuzzy Weighted Geometric Mean

Guixiang Shen¹, Shaohua Fan¹, Yingzhi Zhang¹, Linghui Wei¹, YaZhou Jia¹
¹Jilin University, China

According to the data collected from 23 NC machine tools from one type, based on the fuzzy FMEA model, a Failure modes Analysis have been carried out. Fuzzy linguistic variables were introduced into the analysis, and the three risk factors were given different weights, Each FRPNs of the failure modes were calculated by linear programming, and then the failure mode which influence the NC lathe the most have been pointed out, this

results can provide useful basis on how to eliminate these failure models and how to improve the reliability of NC machine tools of this type.

Study on the Integral Reliability of Jinping First Stage High Arch Dam-Foundation System

Yazhou Jiang¹, Lanyu Xu², Qingwen Ren¹, Wei Xu¹

¹Hohai University, China

²Nanjing Yangtze Water Resources Automation Technology Development Company, China

As it is not enough to assess the integral reliability of the complex 3D high arch dam-foundation system just from local damage in the deterministic analysis, the improved response surface method is firstly introduced to get the failure possibility of individual uncertain factor, and then PNET method to fix the integral reliability considering several uncertain factors. Then the main works are presented as following: (1) find out the main individual failure modes; (2) establish the limit state functions of the main individual failure modes respectively; (3) fix the relevance among the main failure mode and calculate the integral reliability. Finally the results are used to assess the failure possibility and integral reliability of Jinping high arch dam-foundation system.

Reliability Assessment for Product with Wiener Process Degradation Based on Marker Data

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Reliability assessment method based on performance degradation data has been proven to be useful when dealing with products characterized as long-life and highly reliable. However, this method can hardly be applied when measurement of performance degradation is technically difficult or costly. To tackle this problem, this paper proposes to utilize the measurement data which are related to the performance degradation, namely, marker data. It is assumed that the degradation process is modeled with Wiener process, and that the marker is the integral of the performance degradation. We first estimate the parameters of the Wiener process using marker data and then conduct the reliability assessment. A simulated example is presented to demonstrate the proposed method.

Using Evidential Reasoning Approach for Ship Turbine

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Ranking and selection of optimal alternative among a range of alternatives have always been a multifaceted task in real-world complex decision analysis problems due to the qualitative nature of the decision criteria's and also information uncertainties like incomplete i.e. missing or imprecise data. This makes ranking process a difficult task in all multi criteria decision making (MCDM) problems. Evidential reasoning approach advocates a general multi level evaluation process for dealing with MCDM problems. This paper reports the application of evidential reasoning approach to ranking and optimal selection among three techniques utilized for monitoring the condition of a turbine on a transportation ship. The problem was attempted earlier in the literature by different fuzzy MCDM methods. However, the assessment of incomplete information was not at all accounted earlier, which is incorporated in this paper. This paper demonstrates how the evidential reasoning approach could be used as another additional tool to deal with problem of ranking of condition monitoring techniques.

Improvement of Thermal Growth Compensation for Motorized Spindles

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A dual displacement measurement meter applied as a compensatory device for spindle thermal growth compensation, it can reduce the measurement error dramatically from single measurement device. The result matches the laser inspection report, which is an external direct checking device and been considered as one of the best checking device of spindle thermal

growth. However, the non-flat surface of spindle nose, fluctuating measurement distance and the tiny measurement meter can hardly be fitted rectangular to spindle nose surface which create a certain percentage of error when the single displacement measurement meter is applied. The addition of a differential amplifier will greatly enhance the linear output voltage fed back from dual measurement meter to the CPU and provide a high sensitive level of compensation. This new device can reduce the measurement error from 6% down to 1.8%. The machining tolerance can be improved greatly and machining time is reduced. The quality of the machine and the cutting performance can be upgraded.

Crossover Based on Rough Sets - a Case of Multidimensional Knapsack Problem

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This paper uses two algorithms based on the methodology that introduces attribute reduction of rough sets (RS) into crossover of genetic algorithms (GAs). The first algorithm one selects the crossover points, either by attribute reduction or randomly; the second one selects the crossover points solely by attribute reduction, with no crossover otherwise. We test the methodology on the solving of multidimensional knapsack problems using combinations of the number of items and the number of knapsacks, and we compare the experiment results to those of typical GAs. According to the preliminary experimental results, the introduction of attribute reduction has the advantage that increases the mean and decreases the standard deviation of the final solutions when the number of items is medium. Despite that the advantage appears to be less consistent when the number of items increases, the results still show that the mean number of iterations required to terminate the algorithm and the mean number of iterations required to reach maximal solutions can be decreased.

Profitability Evaluation of Cross-Industry Canadian Companies using Data Envelopment Analysis

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This paper presents an evaluation of profitability efficiency of 284 Canadian companies using Data Envelopment Analysis (DEA). In order to address systematic difference among different industries, cross-system analysis is applied to evaluate the performance of Canadian companies in different industries. The results indicate that there is still potential to improve the performance for Canadian companies.

Asset and Liability Management for Exponential Utility Preference in an Incomplete Market: The Martingale Approach

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This paper is concerned with asset and liability management problem in an incomplete market from the viewpoints of expected utility maximization. The liability is supposed to be random process driven by Brownian motion with drift while risky assets' prices are governed by geometric Brownian motion. In addition, there exist correlations between the risky assets and the liability. The analytical optimal portfolios for exponential utility maximization are obtained by applying martingale approach.

A New Heuristic Method Combined with Lagrangian Relaxation Algorithm for Hybrid Flow Shop Problem

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In this paper, a heuristic algorithm which embedded in the Lagrangian relaxation algorithm is proposed to obtain the near optimal solution to minimize the total weighted complete time in the Hybrid flow shop problem (HFS). Compared with the original precedence capacity relaxation algorithm proposed by Tang et.al. in [6], our algorithm can produce a better solution in most cases.

Applying Spatiotemporal ICA with DEA Approach in Evaluating the Training Institution Efficiency of the Semiconductor Institute Program in Taiwan

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In this paper, a two-stage approach of integrating spatiotemporal independent component analysis (stICA) and data envelopment analysis (DEA) is developed for efficiency measurement. stICA is used to search for latent source signals where no relevant signal mixture mechanisms are available; and DEA is used to measure the relative efficiencies of decision making units (DMUs). We suggest using stICA first to extract the input variables for generating independent components (IC), then selecting the ICs representing the independent sources of input variables, and finally inputting the selected ICs as new variables in the DEA model. The training institution dataset provided by the Semiconductor Institute in Taiwan is used for analysis. The result shows that the proposed method can not only separate performance differences between the training institutions but also improve the discriminatory capability of the DEA's efficiency measurement. The study results can serve as a reference for training institutions wishing to enhance their training efficiency.

An Outdoor Navigation Aid System for the Visually Impaired

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In order to provide contextual cues for the visually impaired to navigate safely in outdoor dynamic situations, an outdoor navigation aid system, AudioGuide, is developed based on a PDA in this paper. It leverages technological advances in computer vision, global positioning system (GPS), geographic information system (GIS), and auditory displays. The camera embedded in the PDA captures dynamic environmental information; landmark information along the route queried from a map database built on eSuperMap is provided with the help of the GPS. Furthermore, the route is selected based on the user's familiarity, safety, and distance and thus is optimized for the user. Sonification and auditory icons are utilized to provide intuitive navigational information and natural interactions with the user. Initial usability evaluation shows the feasibility and potential of the AudioGuide for the visually impaired people.

Operator Situation Awareness Assessment Model in a Nuclear Power Plant

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Situation awareness of operators plays a key role in the safety of a nuclear power plant. The establishment of a situation awareness assessment model (SAAM) is the foundation of an advanced HRA method. The paper firstly ascertains the relation between situation awareness and human reliability analysis and then forms an organization-committed cause-effect conception model. On the basis of the above, Bayesian network is used to build SAAM to conduct cause-effect reasoning and diagnosis. The technique makes an assessment on the external influences of the situation awareness of operators in case of given proofs and identifies quantitatively the leading factors affecting operator situation awareness.

A Ergonomics Evaluation Hierarchy for the Typical Manually Controlled Devices in Spaceflight

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²Beijing University of Aeronautics and Astronautics, China

³China Astronaut Research and Training Center, China

Ergonomic evaluation of a manually controlled devices is an important means of testing a man-machine interface matching in manned space medicine and engineering research. It's one of the comprehensive evaluation method based on Delphi, AHP and Grey systems. This study proposed a mathematical model combining subjective weights and objective weights, evaluated a manually controlled devices quantitatively, solved the connection between design features and an operator satisfaction. Furthermore, by conducting a real experiment with both bare

hand and glove box means, it analyzed the operation of the typical manually controlled devices, and verified the feasibility of a comprehensive evaluation and effectiveness of subjective and objective indices.

Astronaut Physical Load Research and Applications

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Study on physical load provides astronauts with important manned space ergonomics guidance. In this paper, quantitative measurement and evaluation methods of physical load were commented, the advantages, disadvantages and improvements of physiological methods, biochemical methods, energy metabolism and subjective methods were analyzed, the application status and future trends of astronaut physical load measuring and evaluating were discussed.

The Research on the Human-Machine Interface Performance Evaluation System for Cannon

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Performance evaluation of cannon human-machine interface is the key during development and use of cannon. The establishment of performance evaluation indicators system is important to ensure scientific and rational performance evaluation. Considering the features of cannon human-machine interface, this paper analyzed the factors that impacted the interactive effectiveness, and then established the cannon human-machine interface performance evaluation indicators system and the evaluation model. Through analysis and comparison, the fuzzy comprehensive evaluation method was chosen to be the cannon human-machine interface performance evaluation method, and its specific steps were shown. In addition, take some type cannon human-machine interfaces as examples to evaluation. The evaluated results should be back to the designers so as to be the reference of improving interface. The evaluation indicators system can also be applied to other weapons system evaluation.

On Non-parametric Approach for Asia-Pacific International Airports

Hsu-Hao Yang¹, Chen-Min Chan¹, Yen-Ju Chen¹, Yen-Sheng Huang¹,

Chia-Jung Kao¹

¹National Chinyi University of Technology, Taiwan

This paper uses stochastic frontier analysis (SFA) to study 12 international airports in the Asia-Pacific region based on data from the period 1998-2006. The SFA model uses a translog production function that is more flexible than a Cobb-Douglas one that is popularly used in the literature. As an extension of a previous study, this paper mainly discusses the implications of the parameter estimates of translog function. The use of a translog function is founded on testing the statistical hypothesis. According to the preliminary results, we suggest that airports should emphasis more on investment than on human resources. In addition, we find that the inefficiency in the SFA model largely results from technical inefficiency, and the inefficiency effects are time-varying and decrease over time. By using the model including environmental factors to explain the inefficiency, we suggest that the inefficiency would be less if the airport is more privatized.

Standard Activity Measurement Plan

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This paper deals with a framework that combines the complementary features of Activity-Based Costing (ABC) and Time-Driven Activity-Based Costing (TDABC). The framework or Standard Activity Measurement Plan is anchored on computing unit cost given the required minimum resources for a particular activity. The activity unit cost is standard and fixed for a certain period until such time significant variables change significantly. The standard unit time per activity is also used to establish the percentage of time spent. In this manner, ABC data collection is minimized if not eliminated totally.

Study on the Economic Externality of Green Building

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This paper presents a deep analysis on the barrier of green building growing with the theory of economic externalities. Through analyses of the relation between the degree of green technology usage with the marginal revenue and marginal cost, a conclusion is drawn that the gap between social revenue and the private revenue will grow when the usage of green technology is becoming more. A Green building rating system is advanced and policy options designed to "internalize" these externalities according to these levels are briefly addressed.

Strategic Management and Activity-Based Costing

Romeo Manalo¹, Marivic Manalo²

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²De La Salle University, Philippines

This paper introduces a framework that could change the way firms set their strategies and goals. This framework links the corporate budget to the corporate strategies which are cascaded down to the last employee of the company. This framework bridges the gap between the operations personnel and with the finance people as they talk of only the jargon of activity or process costs. This framework is flexible as it can increase or decrease the budget from the corporate down to the smallest unit of the firm when the focus or goals of the company change within the period. This framework is an effective tool to predict future budgets and operations of the company as it uses activity costs which are more accurate than the traditional method of forecasting. This framework balances the profit maximization goal of a firm with that of the company's culture or shared values and societal expectations especially environmental protection, customer satisfaction and employee welfare.

Linking Technological Regime to Enterprise Innovation Strategy

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¹Zhejiang University, China

This paper proposes that the specific pattern of innovative activities in an industry can be explained as the outcome of different technological (learning) regimes. A technological regime is defined by four fundamental factors. Building upon the distinction between exploitation innovation strategy and exploration innovation strategy, this paper provides qualitative analysis between patterns of innovation strategy and indicators of the variables defining technological regimes. Based on that, we estimate the relationships between technological regimes and innovation strategy.

Research on Integration of Virtual Reality and Other Library Systems Based on Hierarchical Model

Changzhen Shang¹, Yanqiu Xiao¹

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Accessing to complex information structure is a prerequisite for functions of virtual reality system in actual production and digital libraries. The data from these complex pattern are often organized and stored by other systems. Therefore, virtual reality system must be integrated with them. In this paper, a hierarchical model is presented to solve the problem, which consists of genetic layer, organizational layer, feature layer and demo layer. Reconstruction method in virtual environment was proposed. The information in demo layer and organizational layer were constructed based on the additional data exported from other systems' model. The link between genetic layer and organizational layer was established through a surface-polygon mapping mechanism. Using XML-based neural file and original model file, demo information and topology information contained in the model is transformed and re-constructed through mapping relations. The data sharing problem was presented and verified by integration of CAD and virtual assembly system.

Development of an Hemodialysis Simulator for Interdisciplinary Learning

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Approximately 58,000 patients are receiving hemodialysis in Taiwan, with an increase of about 8,000 patients per year. Hemodialysis accounts for the largest proportion of expenditures for severe illnesses under the National Health Insurance (NHI) program. The hemodialyzer has become the most important healthcare appliance in the medical electronics industry. With limited budgets and practical considerations, this study developed an inexpensive; easy to learn hemodialysis simulation system by simplifying hemodialyzer design while creating an inexpensive hemodialyzer, which typically cost more than 20,000 USD. This system could be used for demonstration and education in Electrical/Electronic Engineering departments or medical schools to improve the quality of engineering-related education.

Optimal Dynamic Hedging of Electricity Futures Based on Copula-GARCH Models

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The electricity futures market is an inevitable product from the development of electricity spot market, it is advantageous to discover the real price of electric power and reduce the risk of electricity market. This paper considers optimal dynamic hedging of electricity futures using copula-GARCH models. The Student's-t, Gumbel and time-varying normal copulas are utilized to capture the dependence structure between spot and futures of electricity, and the GARCH-t model is used to describe the marginal distribution and time-varying variance of spot and futures returns. Compared with conventional hedging strategies, including error correction model and dynamic conditional correlation GARCH model, the results show that copula-GARCH hedge ratios are quite effective in reducing risks in portfolio returns, and the Student's-t copula provides the best-performed hedge ratio for risk reduction.

A Study on Firms' Investment Behavior during Financial Crisis

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Under the backdrop of current global financial crisis, this paper empirically investigate the impacts of financially conservative policy adopted during the pre-crisis period on firms' investment behaviors in crisis. This paper shows that, during the crisis period, (1) financially conservative firms greatly increase their investment expenditures, and financially aggressive firms decrease their investment expenditures substantially, (2) financially conservative firms have greater capacity to raise debt funds, and relatively lower sensitivity of investment to internal funds than financially aggressive firms. (3) financially conservative firms' investment expenditures mainly depend on their growth opportunities. In general, the empirical evidence provided in the paper supports the view that, when hit by adverse shock, firms adopting conservative financial policy before crisis can manage risk more successfully, and raise more needed funds for valuable investment opportunities.

Selecting Criterion of Multivariate Copula Based on the Conditional Probability Integral Transformation

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In the field of financial risk management, there is still no effective solution for the selection and goodness-of-fit test of multivariate Copula functions. This paper proposes a selection criterion for Copula function based on the method of conditional probability integral transformation (CPIT). By comparing the statistics under the CPIT, we discuss the goodness-of-fit of Gaussian Copula, T-Copula and Clayton Copula in different sample sizes and dimensions. By using daily data of 3 stock indices in North America stock market, we compare the test statistics based on

CPIT method with those based on maximum likelihood and kernel density estimates. The results show that the CPIT test can help effectively select the appropriate multivariate Copula function, and results in more accurate and stable statistics in the goodness-of-fit test. Test based on maximum likelihood estimate is unstable while test based on kernel density estimate is less stable for small samples.

Competency-Based Compensation and Equitable Profit Sharing

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This paper is about the promotion of industrial peace where labor and management work hand in hand to succeed in their business. The framework on competency-based compensation and equitable profit sharing are meant to distribute the wealth generated by businesses equitably and to efficiently manage the business in terms of cost and productivity. In this manner, prosperity will be achieved even in developing countries where the gap between the very rich and the very poor is beyond imagination. Profit maximization is given a special meaning in this study. It is no longer just about shareholders' wealth but that of all stakeholders' interests.

An Ontology-based Environment for Effective Collaborative and Concurrent Process Engineering

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Facing global competition in the chemical industry particular companies from high-wage countries have to cut development costs and time to market to be still profitable. Therefore, methods like concurrent and collaborative engineering are increasingly applied. However, these complex workflows require adequate software support to be efficient in face of heterogeneous software environments as typically encountered in most companies. Such software support does virtually not exist in industrial practice to date. In this paper, we propose a novel software prototype built on semantic technologies which is capable of providing such software support and thus helping to improve efficiency in process and plant engineering.

Convexity of Fuzzy Sets from the Viewpoint of Fuzzy Logic

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²Southwestern University of Finance and Economics, China

In order to investigate the graded properties of convex fuzzy sets, from the viewpoint of fuzzy logic, in this paper, we introduce the notions of (λ, T) -convex fuzzy set, (λ, T) -strong convex fuzzy set, (λ, T) -strictly convex fuzzy set based on t -norm based fuzzy logic. The relations among these convex fuzzy sets is characterized.

Market Reactions to Financial Restatement - Evidence from Chinese Stock Market

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The financial statements of a listed firm disclose the company's financial position, operating results and cash flow information, which is an important means for investors to analyze the firm. But in recent years, financial restatements are becoming frequent. Basing on 88 Shanghai and Shenzhen A-share listed firms, which announced annual financial reports restatements during 2006-2008 periods, this paper tests the share price within a short time window changes before and after the restatements announcement through event study. The results show that the financial restatements have a significant negative impact on stock prices within a short time window, which indicating that the market can capture the new information released by restatements announcement.

Requirements Establishment for Complex Product Development Using Value-Focused Thinking

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Establishment of appropriate requirements specification for product design is critical for customer satisfaction. In this paper we present a systematic and analytical approach to this subjective stage. The process, methods and models view of the approach are discussed with regarding to multi-attribute value/utility analysis. It will contribute to material improvement of understanding of customer needs and expectations compared with traditional QFD paradigm, and provide a foundation for value-driven design.

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Internet Stations

8 (Wed), 9 (Thu) & 10 (Fri) December
SICILY ROOM 2501 – Level 1

Useful Telephone Numbers

Conference Secretariat – Meeting Matters International

Cheng-Hoon KHOO (Ms), Conference Manager

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Patrick CHA (Mr), Operations Manager

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Ria WENDARI (Ms), Speaker Manager

Tel: (65) 9125 9393

Emergency Services

Emergency Service (Police, Ambulance, Fire) : 999

24 hour emergency hotline : 110, 112

Health and Hospitals

S. Januário Hospital (Government) : (853) 28313731

Kiang Wu Hospital (Private) : (853) 28371333

Tap Seac Health Centre : (853) 2852 2232

Transport Services

• Buses

(S.A.R.L) : +(853) 2885 0060, +(853) 2878 7809

Transmac : +(853) 28271122

• Taxis

The flagfall charge is MOP13.00 for the first 1600 meters. MOP1.50 will be added for every 230 meters afterwards. Waiting on passengers' request will be charged for MOP1.50 for every minute.

Radio-Taxi-Service : 2851 9519, 2893 9939, 8500 0000 & 2828 3283

About Macau

Macau Government Tourist Office Hotline : (853) 2831 5566

Tourist Assistance Unit : (853) 2833 3000 (24 hours)

Macau Immigration Services of Public Security : (853) 2872 5488

Police Force

Macau International Airport : (853) 2886 1111

Hong Kong International Airport : (853) 8790 7039

Association of Retailers & Tourism Services : (853) 2878 6223

Services (cont'd)

What to do and Where to go in Macau (Own Time Own Target)

Sight-seeing



• St. Dominic's Square

The Square lies in front of St. Dominic's church. St. Domingo's Church is at the end of the paved road. A museum of paintings, sculptures and liturgical ornaments that illustrate the history of the Roman Catholic Church in Asia is on the 3rd floor of the Church. North of the church and you will arrive at the Ruínas de S. Paulo (Ruins of St. Paul). This is the most famous landmark in Macau. Right at the east of the Ruínas de S. Paulo is the Museu de Macau (Macau Museum), in which historical relics of Macau are exhibited. The southeast along the Av. De Almeida Ribeiro (San Ma Lo), you will find the Grand Lisboa, a casino hotel and is known for its magnificence. There are also vendors either side of the Square selling food, clothing and cosmetics amongst other things.

Address: St Domingo Road, Macau

Bus routes: 3, 3A, 4, 8A, 10, 10A, 11, 18, 19, 21A, 26A, 33



• Mount Fortress

Mount Fortress, built in 1617-26, occupies a hilltop to the east of the ruins of St. Paul's. It was constructed by the Jesuits as part of a complex which also included the college and church of St. Paul's. The canons were used only once, when the Dutch invaded Macau in 1622. This was also the first residence of the governors of Macau. Over the following decades trees grew from the platform of the fort, which was transformed into a public park where residents and visitors came to enjoy the views. The only building was an office of the Meteorological Department until 1998 when the three-level Macau Museum, focusing on the history of Macau, was built into the fortress hill.

Address: Praceta do Museu de Macau

Bus routes: 2,6,9,9A,10,10A,12,17,18,19,22,23,28C



• Macau Museum

The Macau Museum is a historical and cultural museum with a vast number of objects of great historical value, which demonstrates the way of life and cultures of the various communities which have been inhabited the city for ages. Located at the Monte Fort and facing St. Paul's Ruins, the Museum also occupies the ancient Fortress, which, dominating the Inner Harbour, was built by the Jesuits at the beginning of 17th century. The Macau Museum was opened on the 18th April 1998, consisting of two underground levels and a third one above the fortress's top platform where the old Meteorological Services is housed.

Address: Praceta do Museu de Macau

Opening hours: 10:00~18:00 (last admission @17:30)

Closed on Mondays.

Bus routes: 7, 8, 8A, 17, 18, 19

• Wine Museum

This 1400 square-meter space is divided into different areas, using several types of supports: maps, texts, photos, tiles and videos, among other. The aim of these sectors is not only to give information regarding the wine and the grapevines, but also to recreate the atmosphere that involves the production of wine, presenting to the visitor the modern and traditional tools connected to the wine production. The visitor can taste different types of wine, an experience included in the ticket price.

Address: Rua Luis Gonzaga Gomes 431 Macau, basement

Opening hours: 10:00 ~ 18:00, Closed on Tuesdays

Bus routes: 1A, 3, 3A, 10, 10A, 10B, 12, 17, 23, 28A, 28B, 28C, 32



• Taipa

In the 18th and early 19th centuries Taipa consisted of two hilly islands and a protected harbour which provided an anchorage for clipper ships and Indiamen engaged in trade with China. Smaller vessels would transship the cargoes of muslin, manufactured goods and opium up the Pearl River to Canton and return with tea, silk, and porcelain for export around the world. The Taipa Flea Market takes place every Sunday in a picturesque area of Taipa Island, between Bombeiros Square and Camões Square in the heart of the old village.

There are many booths selling traditional crafts and souvenirs, food and beverages, brand name items and trifles, clothes, toys and other products. From 11 am to 8 pm., during the fair, there are cultural and recreational events at Maia de Magalhães Square. There are convenient car parks and public transportation in the area.

Address: Taipa, Macau

Bus routes: 11, 22, 28A, 30, 33 & AP1



• Macau Tower Convention & Entertainment Centre

Conquer Macau's highest summit at the Macau Tower, at 338 metres, and stand at the top of the tower by climbing 100 metres up the mast's vertical ladders. The SkyJump, a new attraction at the Macau Tower that takes guests on a 20 second flight over the breathtaking cityscape of Macau, will be the highest adventure of its kind around the world. Taking off from the outer rim of Macau Tower 233 meters above ground, it is an astounding 41 metres higher than the only other Sky Jump in the world at the Sky Tower Auckland. Macau Tower also offers wide range of shopping and dining experiences to the visitors.

Address: Largo da Torre de Macau

Opening hours: 10:00 – 21:00 (weekdays)

09:00 – 21:00 (weekends and public holidays)

Bus routes: 9A, 18, 21, 23, 32



Source: <http://www.macautourism.gov.mo/en/>

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 and Operations Research
2. Design Studies
3. Human Factors Engineering
4. Quality and Reliability

Corresponding to these interests there are three Research Centres in: Human Factors & Ergonomics, Supply Chain Management and Project Management and Advancement.

M.Sc. Programs

The Master of Science program provides graduate level education. It is conducted both part-time (for people who work) and full-time. Applications for admission to the program are invited once a year through announcements in the press prior to the commencement of the program in August.

There are four M.Sc. Programs:

1. M.Sc. Human Factors Engineering
2. M.Sc. Logistics
3. M.Sc. Systems and Project Management
4. M.Sc. Smart Product Design

Research Programs

Ph.D. and M.Eng. are research-oriented programs. Here the students will take several courses, but most of the work is on research. The student will work together with a supervisor, who will help to define a research topic and guide the student.

Typically a student will take a M.Eng. degree and then continue to take a Ph.D. However, applicants with an outstanding bachelor's degree can be admitted directly into the Ph.D. program.