IEEE

IEEM 2015

2015 IEEE International Conference on
Industrial Engineering and Engineering Management

6 - 9 DECEMBER 2015, SINGAPORE

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IEEE

IEEM2016 BALi

2016 IEEE International Conference on
Industrial Engineering and Engineering Management

5-7 Dec 2016

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SUNTEC Convention Centre
1 Raffles Boulevard, Suntec City,
Singapore 039593
Tel: (65) 6337 2888

IEEM 2015 Program Overview

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- Conference Registration
- Pre-Conference Workshop
- Welcome Reception
- Pre-Conference Tour 2: *Singapore Night Tour*

MON - 7 DEC

- Conference Registration
- Official Opening
- Keynote Presentations
- "Meet-the-Editors" Panel Session
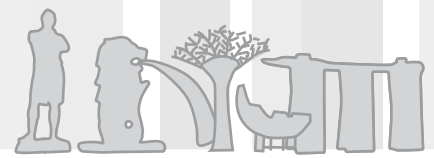- Technical Sessions

TUE – 8 DEC

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- Conference Dinner
    - Universal Studios Singapore

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WELCOME MESSAGE

It is our great pleasure to welcome you to the 2015 IEEE International Conference on Industrial Engineering and Engineering Management (IEEM 2015). After having it in Hong Kong in 2012, Bangkok in 2013 and Kuala Lumpur in 2014, the IEEM Conference once again returns to where it originally started; Singapore. This is also a special year for Singapore as the nation celebrates its 50th year of independence.

As in the past, the strength of the IEEM conference lies in its high conference standard and diversity. It brings together researchers and practitioners from different branches of industrial engineering and engineering management from around the world. In keeping a high standard as for the past IEEM series, each paper went through a rigorous review process.

This year, IEEM 2015 received almost 500 submissions and each paper was sent to at least 3 reviewers. The acceptance decisions were then based on at least two consistent recommendations, ensuring the quality and standard of the conference. These papers, organized around 22 topics, will be presented in oral and poster sessions. We are privileged to have to two eminent scholars from Singapore to deliver the keynote presentations.

Prof. Guaning Su, President Emeritus, Nanyang Technological University (NTU), Singapore, who will present "Systems, Complexity and Innovation in the New Economic Model" while Teck Hua Ho, Deputy President (Research and Technology) and Tan Chin Tuan Centennial Professor, National University of Singapore, Singapore, will highlight on "Does Big Data Solve Big Problems?"

We would like to thank all the authors and participants for their interests, contributions and support to IEEM throughout these years. Last, but never the least, we are also very grateful to technical program committee members and the reviewers for their help in the review process.

Have a fruitful conference and we hope that you will enjoy the cultural experiences of Singapore.

Thomas L MAGNANTI , *General Chair*
Singapore University of Technology and Design (SUTD), Singapore

Kah Hin CHAI , *Organizing Chair*
National University of Singapore, Singapore

Roger JIAO , *Organizing Chair*
Georgia Institute of Technology, USA

Songlin CHEN, *Program Chair*
Nanyang Technological University, Singapore

Min XIE, *Program Chair*
City University of Hong Kong, Hong Kong SAR

General Chair
Thomas L MAGNANTI
Singapore University of Technology and Design , Singapore

Organizing Chairs
Kah Hin CHAI
National University of Singapore, Singapore

Roger JIAO
Georgia Institute of Technology, USA

Program Chairs
Songlin CHEN
Nanyang Technological University, Singapore

Min XIE
City University of Hong Kong, Hong Kong SAR

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Kasetsart University, Thailand

Shinji INOUE
Tottori University, Japan

Raja JAYARAMAN
Khalifa University, United Arab Emirates

Yuya KAJIKAWA
Tokyo Institute of Technology, Japan

Parminder Singh KANG
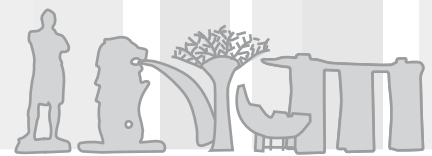*De Montfort University, United Kingdom*

Konstantinos KIRYTOPOULOS
University of South Australia, Australia

Chien-Liang KUO
Chinese Culture University, Taiwan

Chien-Sing LEE
Sunway University, Malaysia

Jinho LEE
Korea Naval Academy, South Korea

Ming-Gong LEE
Chung Hua University, Taiwan

Yanfu LI
CentraleSupelec, France

Chu-Ti LIN
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Jun LIN
Xian Jiaotong University, China

Tyrone T. LIN
National Dong Hwa University, Taiwan

Weidong LIN
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St. John's University, Taiwan

Yiliu LIU
Norwegian University of Science and Technology, Norway

Mei-Chen LO
National United University, Taiwan

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University of Minho, Portugal

Virginia MACHADO
UNIDEMI, FCT-UNL, Portugal

Romeo MANALO
Manila Electric Company, Philippines

Harekrishna MISRA
Institute of Rural Management Anand, India

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Wasawat NAKKIEW
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Gyan PRAKASH
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Mahmood SHAFIEE
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Praxair Inc., United States

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Yamaguchi University, Japan

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Adithya THADURI
Luleå University of Technology, Sweden

Purit THANAKIJKASEM
King Mongkut's University of Technology Thonburi, Thailand

Norbert TRAUTMANN
University of Bern, Switzerland

Yuan-Jye TSENG
Yuan Ze University, Taiwan

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University of Defence, Czech Republic

Seng Fat WONG
University of Macau, Macau

Zheng Guo XU
Zhejiang University, China

Om Prakash YADAV
North Dakota State University, United States

Bingwen YAN
Cape Peninsula University of Technology, South Africa

QZ YANG
Circular Economy Research Centre, China

Xue-Ming YUAN
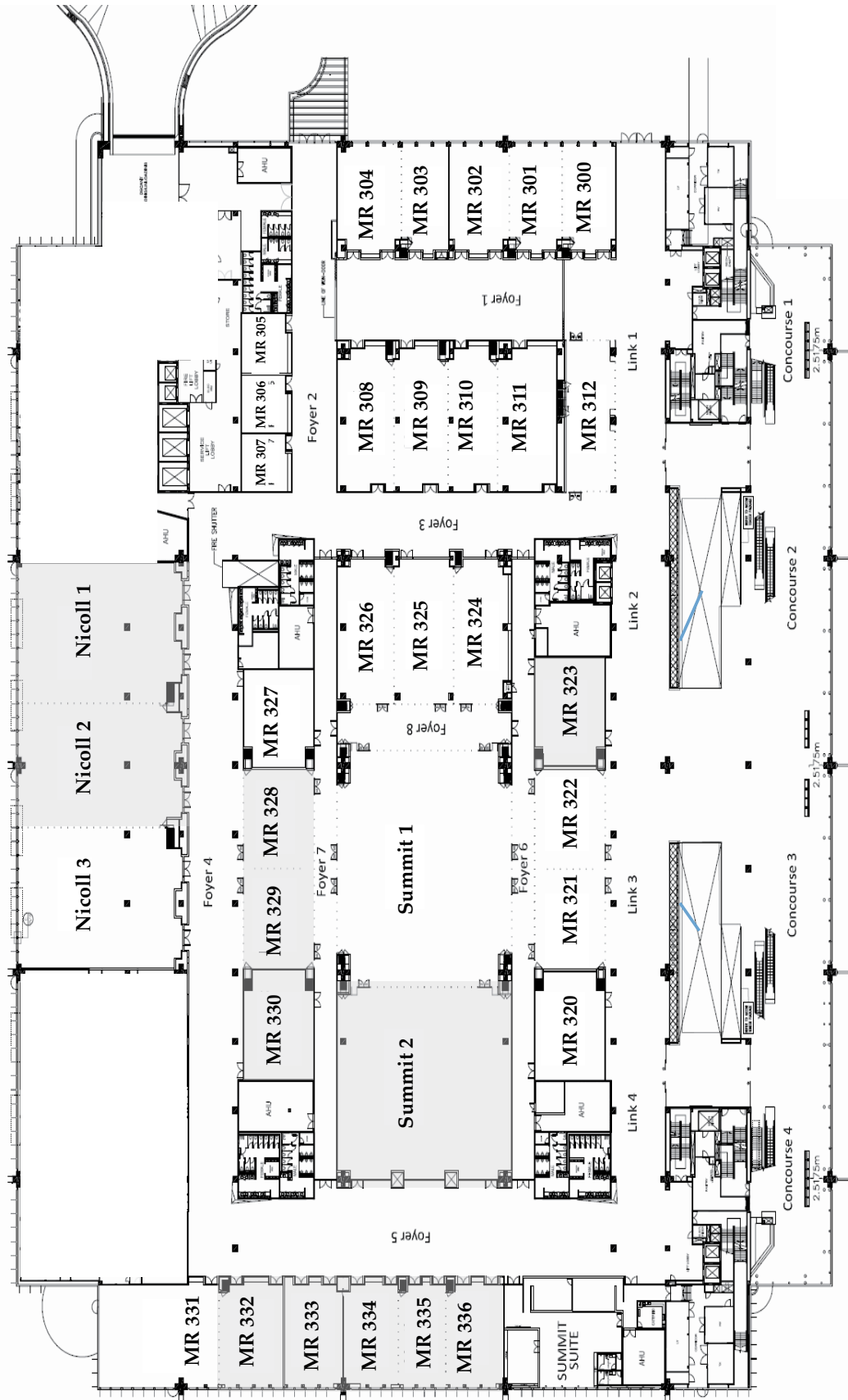*Singapore Institute of Manufacturing Technology, Singapore*

Linda ZHANG
IESEG School of Management, France

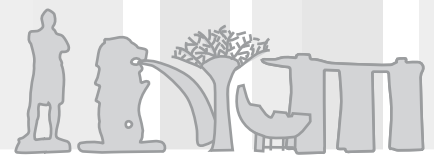Dong ZHAO
Virginia Tech, United States

Level 3

MR 304
MR 303
MR 302
MR 301
MR 300

Foyer 1

MR 305
MR 306
MR 307

Foyer 2

MR 308
MR 309
MR 310
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Link 1

Concourse 1
2.5175m

Foyer 3

Nicoll 1
Nicoll 2
Nicoll 3

MR 326
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MR 324

MR 327
MR 328
MR 329
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Foyer 4

Foyer 7

Foyer 8

MR 323
MR 322
MR 321
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Link 2

Link 3

Link 4

Concourse 2
2.5175m

Concourse 3
2.5175m

Concourse 4
2.5175m

Summit 1

Summit 2

Foyer 6

Foyer 5

MR 331
MR 332
MR 333
MR 334
MR 335
MR 336

SUMMIT SUITE

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PROGRAM OVERVIEW (ACTIVITY LOCATOR)

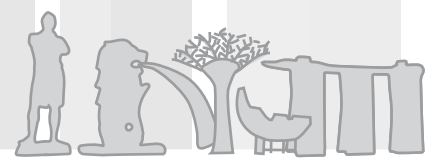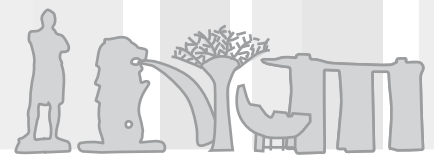|	Sunday, 06 December 2015
10:00 - 14:00	**Pre-conference Tour 1 - Gardens by the Bay** Ticketed Event - ONE Ticket Admits ONE Person Only (Advance Booking Required) Collect Tickets between 09:00 - 10:00 at MR333, Level 3 (Secretariat Office)
14:00 - 17:30	**Delegate Arrival & Conference Registration** Check-in/Collect Conference Issues from: MR332 - MR334, Level 3 Foyer
14:30 - 15:30	Welcome Reception (Conference Participants Attend Free!) Reception Venue: MR332, Level 3
15:00 - 17:00	**Workshop - "Tips to Publish A Paper in International Journals"** **C.L.Philip CHEN** Dean of Faculty of Science and Technology, University of Macau Editor in Chief, IEEE Transactions on Systems, Man, and Cybernetics: Systems, 2014 *Register & Pay at Secretariat Room MR333 from 10am. Terms: SGD20 per person; Cash in Singapore Dollars Only* *Workshop Venue: MR334, Level 3*
17:00 - 21:00	**Pre-conference Tour 2 - Singapore Night Tour** Ticketed Event - ONE Ticket Admits ONE Person Only (Advance Booking Required) Collect Tickets from: MR332 - MR334, Level 3 Foyer

	Monday, 07 December 2015
09:00 - 17:30	**Conference Registration** Check-in/Collect Conference Issues from: MR332 - MR334, Level 3 Foyer
Room	Summit 2, Level 3
09:00 - 09:15	**Conference Opening**
09:15 - 10:00	**Keynote 1** "Systems, Complexity and Innovation in the New Economic Model" **Guaning SU** *President Emeritus, Nanyang Technological University, Singapore*
10:00 - 10:45	**Keynote 2** "Does Big Data Solve Big Problems?" **Teck Hua HO** *Deputy President (Research and Technology) and Tan Chin Tuan Centennial Professor National University of Singapore, Singapore*
10:45 - 11:15	AM Break / Poster Set-up by Authors (Nicoll 1 - 2, Level 3)

	MR323	MR328	MR329	MR330	MR332	MR334	MR335	MR336	Summit 2
11:15 - 12:45	Reliability & Maintenance Engineering 1	Manufac-turing Systems 1	Operations Research 1	Supply Chain Management 1	Quality Control & Management 1	Decision Analysis & Methods 1	Service Innovation & Management 1	Project Management 1	Meet-the-Editors Panel Session
12:45 - 14:00	Lunch / Poster Display (Nicoll 1 - 2, Level 3)								

Rooms	MR323	MR328	MR329	MR330	MR332	MR334	MR335	MR336	Summit 2
14:00 - 15:30	Engineering Economy and Cost Analysis	Human Factors 1	Operations Research 2	Safety, Security & Risk Management 1	Information Processing & Engineering 1	Production Planning & Control 1	Technology & Knowledge Management 1	Systems Modeling & Simulation 1	Reliability & Maintenance Engineering 2
15:30 - 16:00	PM Break / Poster Session 1 (Nicoll 1 - 2, Level 3)								

Rooms	MR323	MR328	MR329	MR330	MR332	MR334	MR335	MR336	Summit 2
16:00 - 17:30	Intelligent Systems	Manufac-turing Systems 2	Operations Research 3	Supply Chain Management 2	Quality Control & Management 2	Decision Analysis & Methods 2	E-Business & E-Commerce	Healthcare Systems & Management 1	Reliability & Maintenance Engineering 3
16:00 - 17:00	Poster Tear Down (Nicoll 1 - 2, Level 3)								

Time	Tuesday, 8 December 2015							
09:00 - 16:00	**Conference Registration** Checkin/Collect Conference Issues from: MR332 MR334, Level 3 Foyer							
Rooms	MR323	MR328	MR329	MR330	MR332	MR334	MR335	MR336
09:00 - 10:30	Reliability & Maintenance Engineering 4	Human Factors 2	Operations Research 4	Systems Modeling & Simulation 2	Information Processing & Engineering 2	Production Planning & Control 2	Technology & Knowledge Management 2	Supply Chain Management 3
	Poster Set-up by Authors (Nicoll 1 - 2, Level 3)							
10:30 - 11:00	AM Break / Poster Session 2 (Nicoll 1 - 2, Level 3)							
Rooms	MR323	MR328	MR329	MR330	MR332	MR334	MR335	MR336
11:00 - 12:30	Reliability & Maintenance Engineering 5	Manufacturing Systems 3	Big Data & Analytics	Project Management 2	Quality Control & Management 3	Facilities Planning & Management	Technology & Knowledge Management 3	Safety, Security & Risk Management 2
12:30 - 13:30	Lunch / Poster Display (Nicoll 1 - 2, Level 3)							
Rooms	MR323	MR328	MR329	MR330	MR332	MR334	MR335	MR336
13:30 - 15:30	Reliability & Maintenance Engineering 6	Human Factors 3	Operations Research 5	Healthcare Systems & Management 2	Quality Control & Management 4	Engineering Education & Training	Service Innovation & Management 2	Supply Chain Management 4
15:30 - 16:15	PM Break & Closing Ceremony / Poster Tear Down (Nicoll 1 - 2, Level 3)							
16:30 - 22:00	**Conference Dinner** - Transfer to Universal Studios Singapore *Ticketed Event - ONE Ticket Admits ONE Person Only (Advance Booking Required)*							
Time	Wednesday, 9 December 2015							
09:00 - 12:00	**Campus Visit: Singapore University of Technology and Design** Please gather in front of Big Screen, SUNTEC Level 1 *Ticketed Event - ONE Ticket Admits ONE Person Only (Advance Booking Required)*							
10:00 - 13:00	**Technical Visits: Marina Barrage and Singapore Maritime Gallery** Please gather in front of Big Screen, SUNTEC Level 1 *Ticketed Event - ONE Ticket Admits ONE Person Only (Advance Booking Required)*							

Sunday - 06 December, 15:00 to 17:00
"Tips to Publish a Paper in International Journals"

C. L. Philip CHEN
Dean of Faculty of Science and Technology, University of Macau
Editor-in-Chief, IEEE Transactions on Systems, Man, and Cybernetics: Systems, 2014

ABSTRACT
Publish or Perish! Publishing is one of very important components for a scholar and faculty members to disseminate their research results. While some of us are frustrated on getting our paper published, we may wonder why some are very successful.

This workshop will discuss the reviewing and publishing process, using IEEE Transactions on Systems, Man, and Cybernetics, as an example. The topic includes the overall process of submission and handling, the review process, the responses to the comments raised by the reviewers, and the techniques to prepare a better readable paper.

BIOGRAPHY
C. L. Philip Chen (S'88–M'88–SM'94–F'07) received the M.S. degree in electrical engineering from the University of Michigan, Ann Arbor, in 1985 and the Ph.D. degree in electrical engineering from Purdue University, West Lafayette, IN, in 1988.

After having worked at U.S. for 23 years as a tenured professor, a department head, and associate dean in two different universities, he is currently the Dean of the Faculty of Science and Technology, The University of Macau, Macau, China and a Chair Professor of the Department of Computer and Information Science.

Dr. Chen is a Fellow of the IEEE and the AAAS. He has been the President of IEEE Systems, Man, and Cybernetics Society (2012-2013). Currently, he is the Editor-in-Chief of IEEE Transactions on Systems, Man, and Cybernetics: Systems (2014-) and an associate editor of IEEE Access and several IEEE Transactions. He is also the Chair of TC 9.1 Economic and Business Systems of IFAC. His research areas are systems, cybernetics, and computational intelligence. He is also a program evaluator of ABET (Accreditation Board of Engineering and Technology) in Electrical Engineering, Computer Engineering, and Software Engineering.

Monday - 07 December, 09:15 to 10:00
"Systems, Complexity and Innovation in the New Economic Model"

Guaning SU
President Emeritus
Nanyang Technological University, Singapore

ABSTRACT

We live in interesting times.

The golden period of classical science, notably after publication of Newton's Laws, was exciting and exhilarating. We were able finally to make sense of the complicated astronomical observations and reduce the principles explaining it to three simple laws of motion and the inverse square law of gravitation. The powers of science in reducing observations to simple physics principles seem infinite. But then Statistical Mechanics, Thermodynamics and Quantum Physics brought us down to reality with a bump – we could not actually solve all problems in such a deterministic manner reducing the problem to a few fundamental principles.

As we get nearer and nearer to the secrets of Life on Earth with genetics, DNA and sequencing, the promise of reducing Life on Earth to physical principles is strong. And yet, why did evolution take place, creating order out of chaos in the primordial soup, seemingly working against the Second Law of Thermodynamics?

On another dimension, quantitative models of human behaviour such as economics, stock prices, social behaviour and collective action, although possible due to the astronomical explosion of computing power and storage density, defies our best efforts at prediction. Indeed, like Heisenberg's Uncertainty Principle in Quantum Mechanics, what we are measuring is changed by the act of measurement itself. Academia is full of such issues, whether in judging a professor's research in quantitative terms or marking schemes of courses with significant group work components.

I will address some of these issues especially those areas relevant to Industrial Engineering and Engineering Management from the point of view of Complexity Science, first pioneered by the academic renegade Santa Fe Institute and now spreading far and wide including in Singapore. Relevance to Business, Management, Politics and Governance will also be explored. The phenomenon of Innovation is particularly worthy of exploration as the driver of progress in Human Society.
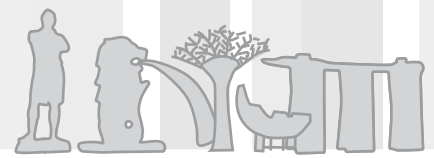
BIOGRAPHY

Professor Su Guaning is President Emeritus and Professor of Electrical and Electronic Engineering at Nanyang Technological University (NTU), Singapore. He graduated from University of Alberta (B.Sc. Eng. 71), Caltech (M.S. 72) and Stanford University (Ph.D., M.S. 84). He was conferred an Honorary Doctor of Science degree by the University of Alberta in Jun 2015.

As NTU President 2003 to 2011, he led a quantum leap in research and education capabilities in NTU, establishing new schools, new undergraduate programmes, major research centres and fund raising and alumni functions. He was founding Chairman of the Global Alliance of Technological Universities and developed strong links with China. His current research interests are in signal processing, complex adaptive systems, technology innovation and entrepreneurship.

Professor Su pioneered research in the Ministry of Defence, Singapore and led the initial build-up of electronic warfare capability. He served as Director Defence Science Organisation 1986-1997, Deputy Secretary (Defence) 1998-2001 and founding Chief Executive of the Defence Science and Technology Agency 2000-2002. Prof Su was a founding Board member of the National Science and Technology Board and served as Deputy Chairman from 1998 to 2000.

Professor Su is a President's Scholar, Registered Professional Engineer and Founding Fellow of the Singapore Academy of Engineering. He is Honorary Fellow and Past President of the Institution of Engineers, Singapore and a Fellow of the Singapore Computer Society. He was conferred the Meritorious Service Medal 2011, Public Administration Medal (Gold 1998 and Silver 1989), Long Service Medal 1998 and Public Service Medal 1997 by the President of Singapore; National Science and Technology Medal 2003, Defence Technology Medal (Outstanding Service 2015), the Chevalier of the Legion of Honour 2005 by the President of France and the Friendship Award 2011 by the State Council, People's Republic of China.

Monday - 07 December, 10:00 to 10:45
"Does Big Data Solve Big Problems?"

Teck Hua HO
Deputy President (Research and Technology) and Tan Chin Tuan Centennial Professor
National University of Singapore, Singapore

ABSTRACT

There is enormous excitement about big data because it promises to solve major societal problems. We have assembled big data sets in healthcare, transportation, and grocery shopping in order to prevent non-communicable diseases, reduce the rate of car accidents, and understand how firms compete and people consume in Asia. We show that big data must satisfy a set of necessary conditions for it to be useful in solving big societal problems.

BIOGRAPHY

Ho Teck Hua is Deputy President (Research and Technology) and Tan Chin Tuan Centennial Professor at the National University of Singapore, where he is also director of the NUS Global Asia Institute and the Centre for Behavioural Economics.

Prior to becoming Deputy President, he was the William Halford, Jr Family Professor of Marketing and director of the Asia Business Center at the Haas School of Business at the University of California, Berkeley.
Teck Hua has received numerous accolades for teaching and research. In February 2015, he received the Williamson Award, the Haas School's highest faculty award. In 2010, he received the Distinguished Teaching Award, UC Berkeley's most prestigious teaching honour. He has also won three Earl Cheit Awards for Excellence in Teaching (2004, 2005, and 2006).

His areas of research expertise include behavioural economics, quantitative marketing, and the interfaces between marketing and operations management. He has written and co-authored significant papers that have been published in top-tier journals. He has been a finalist for three of the most prestigious awards in marketing research: the 2011 William F O'Dell Award, the 2006 John D C Little Best Paper Award, and the 2005 Paul Green Best Paper Award. In 2014, a co-authored paper won the second place Wickham Skinner Best Paper Award from Production and Operations Management.

Teck Hua is the current editor-in-chief of Management Science, the venerable, highly ranked journal for research on management; he is the first non-US citizen to hold this title. He is also one of the most sought after experts on strategic pricing and behavioural change, and has consulted and taught courses for companies such as eBay, Google, and Johnson & Johnson.

He is a fellow at the Singapore Civil Service College and a board member of the National University Health System

Monday - 07 December, 11:15 to 12:45, Summit 2

C. L. Philip CHEN
Editor-in-Chief, IEEE Transactions on Systems, Man, and Cybernetics: Systems, 2014

About the Panelist

C. L. Philip Chen (S'88–M'88–SM'94–F'07) received the M.S. degree in electrical engineering from the University of Michigan, Ann Arbor, in 1985 and the Ph.D. degree in electrical engineering from Purdue University, West Lafayette, IN, in 1988.

After having worked at U.S. for 23 years as a tenured professor, a department head, and associate dean in two different universities, he is currently the Dean of the Faculty of Science and Technology, The University of Macau, Macau, China and a Chair Professor of the Department of Computer and Information Science.

Dr. Chen is a Fellow of the IEEE and the AAAS. He has been the President of IEEE Systems, Man, and Cybernetics Society (2012-2013). Currently, he is the Editor-in-Chief of IEEE Transactions on Systems, Man, and Cybernetics: Systems (2014-) and an associate editor of IEEE Access and several IEEE Transactions. He is also the Chair of TC 9.1 Economic and Business Systems of IFAC. His research areas are systems, cybernetics, and computational intelligence. He is also a program evaluator of ABET (Accreditation Board of Engineering and Technology) in Electrical Engineering, Computer Engineering, and Software Engineering.

Ek Peng CHEW
Editor-in-Chief, Asia Pacific Journal of Operational Research

About the Panelist

Dr CHEW Ek Peng received his Ph.D. in Industrial Engineering from the Georgia Institute of Technology, USA. He is currently an Associate Professor and Deputy Head (Undergraduate Studies) in the Department of Industrial and Systems Engineering at the National University of Singapore. He was a Visiting Scholar and a Visiting Professor, respectively, at the Georgia Institute of Technology and University of British Columbia in 2006. His current research areas are in port logistics and maritime transportation, simulation optimization and inventory management. Some of his research works are published in journals such as European Journal of Operational Research, IIE Transactions, Naval Research Logistics, and Transportation Science. He is serving as Editor-in-Chief of the Asia Pacific Journal of Operational Research and as a member in the Editorial Board of OR Spectrum, Flexible Services and Manufacturing Journal, and International Journal of Industrial and Systems Engineering. He has also co-edited a book in "Advances in Maritime Logistics and Supply Chain Systems', a special issue for OR Spectrum on "IT-based planning and control of seaport container terminals and freight transportation systems" and three special issues for Flexible Services and Manufacturing Journal on "Maritime Container Logistics and Onshore Transportation Systems (Part 1, Part 2 and Part 3)". He and Dr Lee Loo Hay has recently lead a multidisciplinary team of leading researchers and experience practitioners to win the Next Generation Container Port Challenge with a grand prize of US$1 mil by proposing a revolutionary double-storey container terminal, called the SINGA port.

Monday - 07 December, 11:15 to 12:45, Summit 2

Chun-Hsien CHEN
Co-Editor-in-Chief of Advanced Engineering Informatics (ADVEI)

About the Panelist

Prof Chen, Director of the Design Stream, received his BS degree in Industrial Design from National Cheng Kung University, Taiwan, MS and Ph.D. degrees in Industrial Engineering from the University of Missouri-Columbia, USA. He has several years of product design & development experience in the industry. He has served as a technical reviewer for National Science and Technology Awards (Singapore), National Research Foundation of Korea, and a judge for Pin Up Design Awards (Korea), an advisory board member (Singapore representative) of ISPE (International Society for Productivity Enhancement) and various international conferences held in USA, Europe, China, Korea, Malaysia, Hong Kong and Taiwan. Prof Chen is Co-Editor-in-Chief of Advanced Engineering Informatics (ADVEI), a SCI journal published by Elsevier (UK). Besides ADVEI, he is an editorial board member of Recent Patents on Engineering, Journal of Kansei, and Ambient Intelligence and Ergonomics. He is/was a Shanghai Eastern Scholar (appointed by Shanghai Maritime University as an Eastern Chair Professor, 2011 – 2014), a Guest Professor of Tianjin University (since 2013), a Visiting Professor of National Cheng Kung University (2011), a Guest Professor of Shanghai Maritime University (since 2006), and Chaoyang University of Technology (2008 – 2010).

Lalit GOEL
Editor, Electric Power Systems Research

About the Panelist

Lalit Goel was born in New Delhi, India, in 1960. He obtained his BTech Degree in electrical engineering from the Regional Engineering College, Warangal, India in 1983, and his MSc and PhD degrees in electrical engineering from the University of Saskatchewan, Canada, in 1988 and 1991 respectively. He joined the School of EEE at the Nanyang Technological University (NTU), Singapore, in 1991 where he is presently a professor. He served as the Head of the Division of Power Engineering from July 2005 to August 2008. From July 2008 to June 2012, he served as the Dean of Admissions & Financial Aid (re-designated Director of Admissions & Financial Aid with effect from 1 July 2011). Dr Goel was appointed Director, Undergraduate Education (Projects), in the President's Office from Jan 2013 to Dec 2015. Dr Goel is a Fellow of the IEEE. He received the 1997 & 2002 Teacher of the Year Awards for the School of EEE, "Best Teacher of Year 2" awards for 1999/2000, 2000/2001, 2001/2002, 2005/06 and 2009/2010, and the "Best Teacher of Year 3" awards for 2001/2002 and 2002/03. Dr Goel served as the Publications Chair of the 1995 IEEE Power Engineering Society (PES) Energy Management & Power Delivery (EMPD) conference, Organizing Chairman of the 1998 IEEE PES EMPD Conference, Vice-Chairman of the IEEE PES Winter Meeting 2000, Honorary Secretary of the International Power Engineering Conferences (IPEC) in 1997, 1999, 2001 & 2003, Chair of the IEEE PES Powercon2004, Chair of IPEC2005 & IPEC2007, Chair of Tencon2009 and Chair of PMAPS2010. Dr Goel received the IEEE PES Singapore Chapter Outstanding Engineer Award in 2000, and the IEEE PES Outstanding Power Engineering Educator Award in 2009. Dr Goel is the Editor for the International Journal of Electric Power Systems Research, and an editorial board member of the International Journal for Emerging Electric Power Systems. He served as deputy director of NTU's Protective Technology Research Center (PTRC) from May 1999 to April 2007. Dr Goel served as the IEEE Singapore Section Chair from January 2007 to December 2008, and is currently the Asia-Pacific Representative on the IEEE PES Governing Board. Dr Goel is a Fellow of the IEEE. He has published more than 170 international journal and conference papers in the areas of power system reliability, cost/benefit assessment, power markets and renewables.

1. **Prepare Your Presentation**
   Length of presentation material should be in accordance with your time allotted. You are kindly requested to be at the presentation room at least 15 minutes before the session starts and load your presentation material if it is Power Point.

2. **Determine Your Audio-Visual Needs**
   All meeting rooms are equipped with the following:
   1 Projector   1 Laser Pointer & Clicker
   1 Screen   1 Windows-based PC

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

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

   Please discuss the same material as reported in your paper submission. At the end of the meeting, all presentation files will be destroyed.
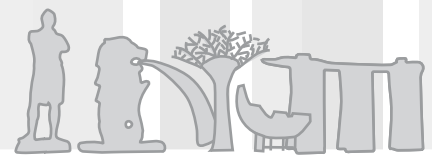
Presenter Guide – Poster

Poster presentations will be held on both Monday – 7 Dec 2015 and Tuesday – 8 Dec 2015 at Nicoll 1 & 2 (Level 3). Poster boards are pre-assigned and marked with your Abstract ID. Please feel free to approach the Poster Help Desk for assistance.

1. **Poster Display and Viewing**

Monday – 7 December 2015	
Presenter Attendance Required During Poster Session 1	From 15:30 - 16:00
Poster Set-up	From 10:45 - 11:15
Poster Tear-down	By 17:00 latest

Tuesday – 8 December 2015	
Presenter Attendance Required During Poster Session 2	From 10:30 - 11:00
Poster Set-up	From 09:00 - 10:30
Poster Tear-down	By 16:00 latest

2. **Prepare Your Poster**

Each presenter is provided with a 1m wide x 2m high poster panel. The presentation must cover the same material as the abstract submitted. The poster should be 1 x A0 size in vertical/portrait format, measuring 841 mm length x 1189 mm height maximum.

a. Place your Abstract ID, Abstract Title and Authors' names prominently at the top of the poster to allow viewers to identify your abstract easily.
    Presenter's Name must be underlined and in Bold Letterings.
b. Authors' names, e-mails and address information must be provided in case the viewer is interested in contacting you for more information.
c. You have complete freedom in displaying your information in figures, tables, text, photographs, etc in the poster.
d. A successful poster presentation depends on how well you convey information to an interested (but not expert) audience. You may wish to structure your poster by including the background of your research followed by results and conclusions.

3. **Set Up Your Poster (See also 1 above)**

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

4. **Remove Your Poster**

a. Posters must be removed after the viewing time by 17:00 on 7 Dec and 16:00 on 8 Dec 2015.
b. After this time, posters remaining on the boards may be removed and discarded by cleaners. IEEM2015 will not be responsible for posters and materials left on poster boards after the stated hours.

Session Schedules, Abstracts & Author Index

Session Schedules

Reliability and Maintenance Engineering 1

7/12/2015 11:15 - 12:45
Room: MR323

Chairs: David Valis
         Baoping Cai

Abstracts: see page 36

Using Oil Quality Indicators as System Technical Life Characteristics and Maintenance Optimizers

David Vališ[1], Libor Zak[2], Jiri Chaloupka[3]
[1]University of Defence, Czech Republic
[2]University of Technology, Czech Republic
[3]Military Technical Research Institute, Czech Republic

An Improved Prediction Model for Equipment Performance Degradation based on Fuzzy-Markov Chain

Wen-zhu Liao, Dan Li
Chongqing University, China

Implementation of System-Based Hazard Analysis on Physical Safety Barrier: A Case Study in Subsea HIPPS

Andika Rachman, R.M. Chandima Ratnayake
University of Stavanger, Norway

Identifying Critical Success & Failure Factors for TQM Implementation: Extract from Case Studies

Vimal Kumar, R. R. K. Sharma
Indian Institute of Technology Kanpur, India

A Reliability Analysis Framework Based on Time-Varying Dynamic Bayesian Network

Yu Liu[1], Baoping Cai[2]
[1]City University of Hong Kong, Hong Kong SAR
[2]China University of Petroleum, China

A Framework of Bayesian Lifetime Demonstration Based on Degradation

Zhengqiang Pan, Tianyu Liu, Quan Sun, Jing Feng
National University of Defense Technology, China

Engineering Economy and Cost Analysis

7/12/2015 14:00 - 15:30
Room: MR323

Chairs: David Valis
         Edwin Cheung

Abstracts: see page 37

Cleaner Production as a Tool to Mitigate Pollution in Leather Processing: Case Study

Ignatio Madanhire, Charles Mbohwa
University of Johannesburg, South Africa

Multivariate Bayesian VSI Control Chart

Xing Zhang, Jian Liu, Chao Tan
Hunan University, China

A New Method of Cost Contingency Management

Mohammed Wajdi Hammad, Alireza Abbasi, Michael J. Ryan
University of New South Wales, Australia

An Empirical Study of the Impact of Project Factors on Software Economics

Jianglin Huang[1], Hongyi Sun[1], Yan-Fu Li[2]
[1]City University of Hong Kong, Hong Kong SAR
[2]CentraleSupelec, France

Two-Way Substitution Effects on Inventory in Configure-to-Order Production Systems

Anna Myrodia, Martin Bonev, Lars Hvam
Technical University of Denmark, Denmark

An Evaluation of Life Long Fly Ash based Geopolymer Cement and Ordinary Portland Cement Costs Using Extended Life Cycle Cost Method in Australia

Clifford Chan, D. Thorpe, M. Islam
The University of Southern Queensland, Australia

Intelligent Systems

7/12/2015 16:00 - 17:30
Room: MR323

Chairs: Linda Zhang
         Babak Abbasi

Abstracts: see page 38

Implications of Product Configurator Applications: An Empirical Study

Linda Zhang[1], Petri Helo[2], Arun Kumar[3], Xiao You[4]
[1]IESEG School of Management, France
[2]University of Vaasa, Finland
[3]RMIT University, Australia
[4]Hewlett Packard Asia Pacific Pte. Ltd., Singapore

Agent-Based General Environment with Market Mechanism

Bingcong Zeng
HP Enterprise, Hong Kong SAR

Functional and Technological Evolution of Enterprise Systems: An Overview

Kourosh Yazdani Rashvanlouei[1], Rainer Thome[1], Khashayar Yazdani[2]
[1]University of Wuerzburg, Germany
[2]Malaysia University of Science and Technology, Malaysia

A Binary Firefly Algorithm for Knapsack Problems

Kaushik Kumar Bhattacharjee, Sarada Prasad Sarmah
Indian Institute of Technology Kharagpur, India

Data-Driven Model Development Using Support Vector Machine for Railway Overhead Contact Wire Maintenance

Yuan Fuqing, Jinmei Lu
University of Tromsø - The Arctic University of Norway, Norway

A Reliability Allocation Method Based on Bayesian Networks and Analytic Hierarchy Process

Zheng Ma, Yi Ren, Linlin Liu, Zili Wang
Beihang university, China

Manufacturing Systems 1

7/12/2015 11:15 - 12:45
Room: MR328

Chairs: R.M. Chandima Ratnayake
Subhas Chandra Mondal

Simple Approach for Value Stream Mapping for Business Process Analysis

Dorota Stadnicka[1], R.M. Chandima Ratnayake[2]
[1]*Rzeszow University of Technology, Poland*
[2]*University of Stavanger, Norway*

Determining the Optimal Manufacturing Tolerance for a Single Machine with Deteriorating Processing Times

Laith Hadidi
King Fahd University of Petroleum and Minerals, Saudi Arabia

Design of Fuel Valve Automatic Performance Test System Based on LabVIEW

Jinyong Yao, Chao Du
Beihang University, China

Dynamic Scheduling of Diffusion Furnace in Semiconductor Manufacturing with Real Time Events

M. Vimala Rani, Muthu Mathirajan
Indian Institute of Science, India

Camera Based Monitoring System for Deep Hole Measurement

Md. Hazrat Ali[1], Akio Katsuki[2]
[1]*Nazarbayev University, Kazakhstan*
[2]*Kyushu University, Japan*

Iterative Optimization of Tool Path Planning in Five-Axis Flank Milling by Sampling Techniques

Chi-Lung Kuo, Chih-Hsing Chu
National Tsing Hua University, Taiwan

Decision-Making Method of Reconfigurable Manufacturing System's Reconfiguration Timing Based on Catastrophe Theory

Sihan Huang, Guoxin Wang, Yan Yan
Beijing Institute of Technology, China

Human Factors 1

7/12/2015 14:00 - 15:30
Room: MR328

Chairs: Seng Fat Wong
Chan Wai Lee

A Study of Shoulder Rest's Feet Height Variation on Upper Trapezius Muscle Activity in Violinists

Seng Fat Wong, Iok Peng Lei
University of Macau, Macau

An Innovative Modeling Method to Evaluate Human Factor Eﬀects on the Performance of Manufacturing Systems

Ahmad Sobhani, M. I. M. Wahab, W. Patrick Neumann
Ryerson University, Canada

Psychological Empowerment as a Strategy for Personnel Retention in the Oilfield Service Industry

Ngozi Onyemeh, Chan Wai Lee, Saadeesh Gunasekaran
University of Nottingham, Malaysia

The Linkages Among Horizontal Strategy, Person-Environment Fit and Strategic Human Resource Management

Pratima Verma, R. R. K. Sharma
Indian Institute of Technology Kanpur, India

The Prediction of Human Error Probability Based on Bayesian Networks in the Process of Task

Lin Mu, Boping Xiao, Weikang Xue, Zhen Yuan
Beihang University, China

Variation of Friction Coefficient of Floors Under Five Liquid Contamination Conditions for Prevention of Slip & Fall Injuries in Restaurants

Chia Yu Chang[1], Kai-Way Li[1], Ching-Chung Chen[2]
[1]*Chung Hua University, Taiwan*
[2]*Hsing Wu University, Taiwan*

Manufacturing Systems 2

7/12/2015 16:00 - 17:30
Room: MR328

Chairs: R.M. Chandima Ratnayake
Alan Pilkington

Beyond the Obvious: A Framework for Exploiting the Impact of 3D Printing

Alan Pilkington[1], Thomas Frandsen[2], Märtha Rehnberg[2]
[1]*University of Westminster, United Kingdom*
[2]*Copenhagen Business School, Denmark*

Investigation of Process Approach Implementation in Manufacturing Firms: A Methodology for Assessing Process Excellence Level

Dorota Stadnicka[1], R.M. Chandima Ratnayake[2], Katarzyna Antosz[2]
[1]*Rzeszow University of Technology, Poland*
[2]*University of Stavanger, Norway*

Comparison of Artificial Neural Model and Response Surface Model During EDAG of Metal Matrix Composite

Pankaj Kumar Shrivastava[1], Avanish Kumar Dubey[2]
[1]*AKS University, India*
[2]*Motilal Nehru National Institute of Technology Allahabad, India*

The Influence of Annealing on Material Properties of Rotary-Friction Welded Steel-Parts

Sirichai Torsakul[1], Jakkarin Kongsib[1], Alexander Brezing[2]
[1]*RMUTT, Thailand*
[2]*King Mongkut's University of Technologz North Bangkok, Thailand*

Fabrication of Graded Structures by Extrusion 3D Printing

John Giannatsis, Aggelos Vassilakos, Vassilis Canellidis, Vassilis Dedoussis
University of Piraeus, Greece

Design Process Using Lean Six Sigma to Reduce the Receiving Discrepancy Report of ACE Logistics

J. Bersamin, R. Drio, A.L. Lacibal, C. Manalastas, Sheily Mendoza, G.D. Orallo, C.T. Tan
University of Perpetual Help System DALTA, Philippines

Operations Research 1

7/12/2015 11:15 - 12:45
Room: MR329

Chairs: Shih-Hsin Chen
Godwin Tennyson

Finding the Robust Quickest Path for Call-Taxis in a City Road Network

Godwin Tennyson
Indian Institute of Management Tiruchirappalli, India

Bi-Criterion Single Machine Scheduling Problem with a Past-Sequence-Dependent Setup Times and Learning Effect

Shih-Hsin Chen[1], V. Mani[2], Y. H. Chen[3]
[1]Cheng Shiu University, Taiwan
[2]Indian Institute of Science, India
[3]Asia University, Taiwan

Placing a Liaison with Long Communication Lengths Between Two Members in an Organization Structure

Kiyoshi Sawada
University of Marketing and Distribution Sciences, Japan

A Robust Optimization Approach to Postdisaster Relief Logistics Planning Under Uncertainties

Yajie Liu, Ping Jiang
National University of Defense Technology, China

Search-Enhanced Job Dispatching in a Dynamic Permutation Flowshop

Ahmed W. El-Bouri
Sultan Qaboos University, Oman

New Benchmark Results for the Stochastic Resource-Constrained Project Scheduling Problem

Roel Leus[1], Salim Rostami[2], Stefan Creemers[3]
[1]University of Leuven – KU Leuven, Belgium
[2]École Nationale Supérieure des Mines de Saint-Étienne, France
[3]IESEG School of Management, France

Selection of Base Fluid for Drilling Mud Using Analytic Hierarchy Process

Gowri Rajagopal, Malliga Poosandaram
Anna University, India

Operations Research 2

7/12/2015 14:00 - 15:30
Room: MR329

Chairs: Philipp Baumann
Mohamed Haouari

Efficient Deployment of Mobile Detectors for Security Applications

Philipp Baumann[1], Reynold J. Cooper[2], Dorit S. Hochbaum[1], Nidhi Patel[2], Kunal Shalia[1]
[1]University of California, Berkeley, United States
[2]Lawrence Berkeley National Laboratory, United States

A PSO Approach for Robust Aircraft Routing

Mohamed Ben Ahmed[1], Farah Zeghal Mansour[2], Mohamed Haouari[1]
[1]Qatar University, Qatar
[2]Université de Tunis El Manar, Tunisia

Extension of the Dominance Properties for the Unrestricted Block Relocation Problem

Shunji Tanaka
Kyoto University, Japan

A Simulated Annealing Algorithm to the Stochastic Network Interdiction Problem

Udom Janjarassuk[1], Thawee Nakrachata-Amon[2]
[1]King Mongkut's Institute of Technology Ladkrabang, Thailand
[2]Khon Kaen University, Thailand

Minimization of the Makespan a Project in the Critical Chain Project Management Framework Using a Max-Plus Linear Representation

Hiroyuki Goto, Hajime Yokoyama
Hosei University, Japan

Emergency Response Model of Stock-Prepositioning with Transportation Constraints

Prudensy Febreine Opit, Koichi Nakade
Nagoya Institute of Technology, Japan

Operations Research 3

7/12/2015 16:00 - 17:30
Room: MR329

Chairs: Raja Jayaraman
Amr Eltawil

A Deterministic IP Model for Optimizing Bus Scheduling in a Private Transportation System

Mojahid F. Saeed Osman[1], Mowffq M. Al-Sanousi[2]
[1]American University of Sharjah, United Arab Emirates
[2]Saudi Arabian Oil Company, Saudi Arabia

A Goal Programming Model with Satisfaction Function Applied to Sustainability Related Goals of the United Arab Emirates

Raja Jayaraman[1], Danilo Liuzzi[1], Cinzia Colapinto[2], Davide La Torre[3]
[1]Khalifa University, United Arab Emirates
[2]Ca' Foscari University of Venice, Italy
[3]University of Milan, Italy

An Evaluation Carbon Footprint in Fly Ash Based Geopolymer Cement and Ordinary Portland Cement Manufacture

Clifford Chan, D. Thorpe, M. Islam
The University of Southern Queensland, Australia

Monarch Migration Algorithm for Optimization Problems

Kaushik Kumar Bhattacharjee, Sarada Prasad Sarmah
Indian Institute of Technology Kharagpur, India

Solving the Single Machine Total Weighted Tardiness Problem Using Bat-Inspired Algorithm

Wanatchapong Kongkaew
Prince of Songkla University, Thailand

Adjusted Clustering Clarke-Wright Saving Algorithm for Two Depots-N Vehicles

Siana Halim, Lydia Yoanita
Petra Christian University, Indonesia

Evaluation and Selection of Periodic Inventory Review Policy for Irregular Demand: A Case Study

Fengyu Wang, Laura Xu Xiao Xia
Singapore Institute of Manufacturing Technology, Singapore

Supply Chain Management 1

7/12/2015 11:15 - 12:45
Room: MR330

Chairs: Peter Kuhlang
Chao Fang

Abstracts: see page 46

Productivity Improvement in Logistical Work Systems of the Genuine Parts Supply Chain

Peter Kuhlang[1], Alexander Sunk[2]
[1]German MTM Association, Germany
[2]Vienna University of Technology/ Fraunhofer Austria Research GmbH, Austria

A Pricing Strategy to Align Supply Chain Interests for Product Recall

Hongyan Dai, Nan Yang, Nina Yan
Central University of Finance and Economics, China

SCM Logistics Scorecard: A Simplified Benchmarking Tool for Supply Chain Operational Performance

Sadami Suzuki
Tokyo Institute of Technology, Japan

Supply Chain Management in Service Industry: A Process Capabilities Perspective

Sakun Boon-itt[1], Chee Yew Wong[2], Christina Wong[3]
[1]Thammasat Business School, Thailand
[2]Leeds University Business School, United Kingdom
[3]Hong Kong Polytechnic University, Hong Kong SAR

Solving the One-Shot Decision Theory Based Newsvendor Models

Xide Zhu, Peijun Guo
Yokohama National University, Japan

SD Modelling of Healthcare SC in Rural Parts of Uttarakhand, India

Dinesh Kumar, Dinesh Kumar
Indian Institute of Technology Roorkee, India

A Mixed-Integer Programming Model for the Production-Inventory-Distribution Routing Problem

Noha Mostafa, Amr Eltawil
Egypt-Japan University for Science and Technology, Egypt

Safety, Security & Risk Management 1

7/12/2015 14:00 - 15:30
Room: MR330

Chairs: Zhiqiang Cai
Fuqing Yuan

Abstracts: see page 47

Information Security Evaluation of System based on Bayesian Network

Zhiqiang Cai, Jiangbin Zhao, Yang Li, Shubin Si, Mengni Ni
Northwestern Polytechnical University, China

A Risk Management Methodology for R&D Project Risk Based on AHP and Fuzzy Comprehensive Evaluation Method

Wenbo Jiang, Huaqi Chai
North Western Polytechnical University, China

An Investigation to the Environmental Impacts of a Limestone Mine in Neka, Iran

Abbas Barabadi, Jinmei Lu
University of Tromsø - The Arctic University of Norway, Norway

An Analysis of Floor Roughness & Slip Resistance of Floors

Wei Ting Mai[1], Kai-Way Li[1], Ching-Chung Chen[2]
[1]Chung Hua University, Taiwan
[2]Hsing Wu University, Taiwan

Critical Antecedents for Construction Organizational Learning Concerning Safety Knowledge from Success and Accidents

Lianying Zhang, Haiyan Guo, Xiaoyan Huo
Tianjin University, China

Effects of Footwear Sample Area on the Friction Coefficient on the Floor

Hung-Kai Tsai[1], Kai-Way Li[1], Ching-Chung Chen[2]
[1]Chung Hua University, Taiwan
[2]Hsing Wu University, Taiwan

Supply Chain Management 2

7/12/2015 16:00 - 17:30
Room: MR330

Chairs: Jayendran Venkateswaran
Harekrishna Misra

Abstracts: see page 48

Million Solar Urja Lamp Programme: A Supply Chain Experience

Nikhil Sawal, Jayendran Venkateswaran, Chetan Singh Solanki, N.C. Narayanan
Indian Institute of Technology Bombay, India

Facility Location Problem with Data Uncertainty for Quality Rice Development

Wichitsawat Suksawat Na Ayudhya
King Mongkut's Institute of Technology, Thailand

Novel Approach to Optimize Milk-Run Delivery: A Case Study

Thi Hong Dang Nguyen, Thien-My Dao
École de Technologie Supérieure, Canada

A Study of Reverse Logistics Practices: A Case Study of the Computer Parts Industry in Thailand

Pornwasin Sirisawat[1], Tossapol Kiatcharoenpol[1], Ninlawan Choomrit[2], Pilada Wangphanich[2]
[1]King Mongkut's Institute of Technology Ladkrabang, Thailand
[2]Srinakharinwirot University, Thailand

The Complexity of Electronic Data Interchange (EDI) Compliance for Automotive Supply Chain

Jardini Bahija[1], Elkyal Malika[1], Amri Mostapha[2]
[1]Ibn Zohr University, Morocco
[2]Hassan II University, Morocco

Allocation and Proportion Decision in Multi-Tier Supply Network

Avinash Bagul, Indrajit Mukherjee
Indian Institute of Technology Bombay, India

Quality Control and Management 1

7/12/2015 11:15 - 12:45
Room: MR332

Chairs: Chen-ju Lin
               Wassanai Wattanutchariya

Process Selection Based on Overall Process Yield

Y. J. Lan, Chen-Ju Lin
Yuan Ze University, Taiwan

Hurdle Model with Random Effects for the Study of Copper Hillocks Growth in Integrated Circuits Manufacturing

Guilin Li, Royston Tan, Szu Hui Ng, Daniel Chua
National University of Singapore, Singapore

The Classification Methodology of Chip Quality Using Canonical Correlation Analysis-Based Variable Selection on Chip Level Data

Ki-Hyun Kim, Hyung-Shin Kwon, Hee-Il Hong, Hong-Sun Hwang, Kang-Yong Cho, Gyo-Young Jin
Samsung Electronics Co., Ltd., South Korea

A Combined Synthetic and Generalized Variance Control Chart for Bivariate Case

Ming Ha Lee, Yiing Chee Tan, Winnie Wei Wan Lam
Swinburne University of Technology Sarawak Campus, Malaysia

Optimization Design of X^bar&EWMA Control Chart for Minimizing Mean Number of Defective Units per Out-of-Control Case

Mohammad Shamsuzzaman[1], Imad Alsyouf[1], Ahad Ali[2]
[1]University of Sharjah, United Arab Emirates
[2]Lawrence Technological University, United States

Purple Rice Dessert Product Development by Quality Function Deployment Technique and Mood Consumption Concept

Wassanai Wattanutchariya, Panitnart Krutasood
Chiang Mai University, Thailand

Information Processing and Engineering 1

7/12/2015 14:00 - 15:30
Room: MR332

Chairs: SC Johnson Lim
               Shane Xie

A Collaborative Tagging System Design Framework for Supporting Affective Design

S. C. Johnson Lim, Anies Faziehan Zakaria
Universiti Tun Hussein Onn Malaysia, Malaysia

Towards Future Information Management for High Value Component Manufacturers

Danqing Jessie Cai, Lindawati Lindawati
SAP Innovation Center Singapore, Singapore

An Active Learning Variable-Fidelity Metamodeling Approach for Engineering Design

Qi Zhou, Ping Jiang, Hui Zhou, Leshi Shu
Huazhong University of Science & Technology, China

Structuring the Engineering Change Management Process Around Change Carriers

Peter Sjögren, Bjorn Fagerström
Mälardalen University, Sweden

Reconstruction of Smooth Contours from Low Resolution Digital Elevation Model Data

Hiroyuki Goto[1], Tatsuya Ishige[1], Yoichi Shimakawa[2]
[1]Hosei University, Japan
[2]Salesian Polytechnique, Japan

Cloud-Based Data Exchange and Messaging Platform Implementation for Virtual Factory Environment

Yuqiuge Hao, Petri Helo, Ahm Shamsuzzoha
University of Vaasa, Finland

Quality Control and Management 2

7/12/2015 16:00 - 17:30
Room: MR332

Chairs: Subhas Chandra Mondal
               Ville Ojanen

Environmental Performance Evaluation (EPE) for Small Medium Industries

Pregiwati Pusporini[1], Kazem Abhary[2]
[1]University of Muhammadiyah Gresik, Indonesia
[2]University of South Australia, Australia

Fatigue Life Analysis and Life Expectancy Design Strategy for Flexible Hinge Under Random Variable Amplitude Loading

Jianjun Wu, Jiawei Wu, L. Q. Wang, X. M. Wu
Jiangxi University of Science and Technology, China

Dynamics of a Relationship Between Quality and Productivity in the Automotive Manufacturing Industry

Tshepo Mpshe, Grace Kanakana
Tshwane University of Technology, South Africa

Bayesian Sampling Plans with Interval Censoring

Wanbo Lu[1], Tzong-Ru Tsai[2]
[1]Southwestern University of Finance and Economics, China
[2]Tamkang University, Taiwan

Decision Analysis and Methods 1

7/12/2015 11:15 - 12:45
Room: MR334

Chairs: Egon Mueller
            Mei-Chen Lo

Abstracts: see page 52

Scaffolds and Design Factors to Increase Creative Outcomes in Teaching Software Design and Testing

Chien-Sing Lee[1], K. Daniel Wong[2], Simon Boung-Yew Lau[3]
[1]Sunway University, Malaysia
[2]Malaysia University of Science and Technology, Singapore
[3]University College of Technology Sarawak, Malaysia

Entrepreneur's Priority Traits on Creative and Innovative Behavior in Technology Era – Case of Innovative New Start-Up Businesses

Mei-Chen Lo[1], Yi-Chuan Hsu[1], Martin Drozda[2]
[1]National United University, Taiwan
[2]Slovak University of Technology, Slovakia (Slovak Republic)

Organizational Structure and the Dynamics of Collaboration Relationship

Xiao-Li Chen[1], Antonia Mahling[1], Ralph Riedel[2], Egon Mueller[2]
[1]Technische Universität Chemnitz, Germany
[2]Chemnitz University of Technology, Germany

The Effect of Buy-Back Policy in Air Cargo Revenue Management

Danping Lin[1], Carman Ka Man Lee[2], Jiin Yang[2]
[1]Shanghai Maritime University, China
[2]The Hong Kong Polytechnic University, Hong Kong SAR

The Optimal Ordering Quantity Model Under the Uncertain Food Safety Environment with a Risk Aversion Concept

Shu-Yen Hsu, Tyrone T. Lin, Chiao-Chen Chang
National Dong Hwa University, Taiwan

Employing a Bridge Triage Method in Municipalities with Decreasing Populations: An Empirical Analysis of the Characteristics of Road Networks

Takaaki Kawanaka[1], Masanobu Matsumaru[2], Shuichi Rokugawa[1], Hirohito Suzuki[2]
[1]The University of Tokyo, Japan
[2]Kanagawa University, Japan

Energy for 2030 Scenarios for a Sustainable Future: A Case of Sri Lanka

Amila Withanaarachchi, Julian Nanayakkara, Chamli Pushpakumara
University of Kelaniya, Sri Lanka

Production Planning and Control 1

7/12/2015 14:00 - 15:30
Room: MR334

Chairs: Mojahid Saeed Osman
            Laith Hadidi

Abstracts: see page 54

Dynamic Job Sequencing in Two Parallel Two-Machine Flow Shop

Mojahid F. Saeed Osman
American University of Sharjah, United Arab Emirates

Research on Single-Level Lot-Sizing Problem under the Time-Varying Environment

Jie Zhang, Jianrui Dong, Yiyong Xiao
Beihang University, China

An Integrated Non-Cyclical Preventive Maintenance and Production Planning Model for a Multi-Product Production System

Xuejuan Liu[1], Wenbin Wang[1], Tian Zhang[1], Qingqing Zhai[2], Rui Peng[1]
[1]University of Science and Technology Beijing, China
[2]Beihang University, China

Factors Affecting Schedule Nervousness in the Production Operations of Airline Catering Industry

Narat Hasachoo, Ruedee Masuchun
King Mongkut's Institute of Technology Ladkrabang, Thailand

Comparative Research on Operation Models of Reverse Logistics

Yan Peng, Yuan Zhao
Tianjin University, China

A Spreadsheet Based Genetic Algorithm Model for Hybrid Flowshop with Batch and Discrete Processors

Siew-Chein Teo
Multimedia University, Malaysia

Decision Analysis and Methods 2

7/12/2015 16:00 - 17:30
Room: MR334

Chairs: Chien-Sing Lee
            Zhisheng Ye

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Building Priority Strategies of Brand Equity Measurement with AHP – Case of Mobile Companies in Taiwan

Mei-Chen Lo[1], Yi-Chuan Hsu[1], Martin Drozda[2]
[1]National United University, Taiwan
[2]Slovak University of Technology, Slovakia (Slovak Republic)

Contractor Selection in Construction Industry: A Multicriteria Model

Maria Creuza Borges de Araújo, Luciana Alencar, Caroline Mota
Universidade Federal de Pernambuco, Brazil

Classification of Areas Using a Multiple Criteria Approach for a Public Security Problem

Ciro Figueiredo[1], Caroline Mota[2], Debora Pereira[1]
[1]Federal University of Pernambuco, Brazil
[2]Universidade Federal de Pernambuco, Brazil

On a Staged Successive Approximation Procedure for Approximate Dynamic Programming Solutions to Board Game Playing

Eiji Mizutani
National Taiwan University of Science and Technology, Taiwan

Decision Evaluation and Analysis of Optimal Functional Training Time Investment in Aesthetic Medicine

Hui-Tzu Yen, Tyrone T. Lin
National Dong Hwa University, Taiwan

Application of the Binomial Switch Option in a Decision Analysis for an Art Exhibition

Wen-Tsung Wu, Chie-Bein Chen
National Dong Hwa University, Taiwan

A Rough Set Based Fuzzy Axiomatic Design Approach in Evaluating Customer-Centric Design Alternatives

Pai Zheng, Shane Xie
The University of Auckland, New Zealand

Service Innovation and Management 1

Chairs: Yongrae Cho
            Lindawati

Abstracts: see page 56

The Competitive Strategy in Global Engineering Industry: Strategic Group Analysis

Yongrae Cho[1], Jongpil Lee[2], Kyutae Kim[3]
[1]STEPI - Science and Technology Policy Institute, South Korea
[2]KITECH - Korea Institute of Industrial Technology, South Korea
[3]COMPA - Commercialization Promotion Agency for R&D Outcome, South Korea

Understanding Household Electricity Saving in Taiwan Through the Theory of Planned Behavior: Focusing on Differences Between User Types

Pei Ling Liu, Hung Chih Lai, Yao Cheng Yu, Iris Hsia-Pei Liu, Poyi Chen, Chia-Chun Chen, Yi-Min Tuan, Hui Shan Kuo
National Taiwan University, Taiwan

Explore the Effects of Interfirm Cooperation and Collaboration Between Supply Chain Integration and Service Innovation Performance

Tsai Wei-Chen
Aletheia University, Taiwan

Design and Development of a Performance Evaluation System for Aircraft Maintenance Industry

Kam Hung Ng, Hau Man Tang, Carman Ka Man Lee
The Hong Kong Polytechnic University, Hong Kong SAR

Digital Services Innovation for Aging-in-Place

Q.Z. Yang, C.Y. Miao, Z.Q. Shen
Nanyang Technological University, Singapore

Impact of Values on Subjective Well-Being of the Post-80s Generation

Yang Zhang[1], Ya-ting Wang[1], Li-ting Kang[2], Yong Wang[3]
[1]University of Chinese Academy of Sciences, China
[2]Zhongnan University of Economics and Law Wuhan College, China
[3]Chinese Academy of Sciences, China

Service Innovation Development through China's New Urbanization: An Economic Policy Perspective

Weilin Zhao
Fujitsu Research Institute, Japan

Technology and Knowledge Management 1

Chairs: Chia-Nan Wang
            Keng-Chieh Yang

Abstracts: see page 58

MOD Traffic Packet Loss in Video Streaming for End-Users' Continuous Using Willingness

Tze-Jen Wang, Chie-Bein Chen, Chia-Sheng Lu
National Dong Hwa University, Taiwan

Tacit Knowledge Transfer and its Implementation on Small and Medium Enterprises

Augustina Asih Rumanti, Trifenaus Prabu Hidayat, Yeremia Dwi Saputro
Atma Jaya Catholic University of Indonesia, Indonesia

Evaluation of Smartphone Feature Preference by a Modified AHP Approach

Faith Ho, Chia-Nan Wang, Chengter Ho, Yu Cheng Chiang, Ying-Fang Huang
National Kaohsiung University of Applied Sciences, Taiwan

An Application of Text Mining to Understand the Productivity Challenges in Singapore

Andy Ang, Boon Yong Ong, Puay Siew Tan
Singapore Institute of Manufacturing Technology, Singapore

Unpacking the Developmental Process of Shared Mental Model Between Technologists and Artists

Han-Chang Ling[1], Chao-Tung Wen[1], Hsueh-Liang Fan[2]
[1]National Chengchi University, Taiwan
[2]Ministry of Science and Technology, Taiwan

Managing Interdisciplinary Research Clusters

Sarah Müller, Thomas Thiele, Claudia Jooss, Anja Richert, Rene Vossen, Ingrid Isenhardt, Sabina Jeschke
RWTH Aachen University, Germany

E-Business and E-Commerce

Chairs: Lei Chen
            Keng-Chieh Yang

Abstracts: see page 59

Intelligent Mining on Purchase Information and Recommendation System for E-Commerce

Weikang Xue, Boping Xiao, Lin Mu
Beihang University, China

Why is Your E-Store Popularity Always Lower?

Te-King Chien[1], Hon-Yu Ma[2], Kai-Chi Yang[1]
[1]National Formosa University, Taiwan
[2]Ten-In Food Co., Ltd, Taiwan

Humanizing Websites: Website Personality for E-Services

Jessica Sze Yin Ho[1], Kok-Wai Chew[2], Nasreen Khan[2]
[1]Sunway University Business School, Malaysia
[2]Multimedia University, Malaysia

The Impact of IT Governance on Performance of IFRS Conversion Under ERP Systems

Wen-Hsien Tsai, Po-Yuan Chu, Jui-Chu Chang, Hsiu-Li Lee, Yi-Chin Huang
National Central University, Taiwan

The Impact of IT Management Process of COBIT 5 on Internal Control, Information Quality, and Business Value

Wen-Hsien Tsai, Chu-Lun Hsieh, Chung-Wei Wang, Chuan-Tu Chen, Wei-Hsiang Li
National Central University, Taiwan

Evaluating the Effectiveness of Online Product Planning and Layout Tools in Online Apparel Shopping

Kin Meng Sam[1], Chris Chatwin[2]
[1]University of Macau, China
[2]University of Sussex, United Kingdom

Applying Fuzzy Delphi method and Fuzzy AHP for Performance Measurement of the Government Information Unit

Yi-Hui Liang
I-Shou University, Taiwan

Project Management 1

7/12/2015 11:15 - 12:45
Room: MR336

Chairs: Leon Pretorius
            Norbert Trautmann

Abstracts: see page 60

Effects of Culture on Project Management Contributing to the Success of Managing Culturally Diverse Engineering Teams in a Global Environment

Larno Meyer[1], Jan Harm Pretorius[1], Leon Pretorius[2]
[1]*University of Johannesburg, South Africa*
[2]*University of Pretoria, South Africa*

On an Application of Microsoft Excel's Evolutionary Solver to the Resource-Constrained Project Scheduling Problem RCPSP

Norbert Trautmann, Mario Gnaegi
University of Bern, Switzerland

Preventive Controlling of Product Development Projects by Aid of Predictive Analytics - Identifying Hot Spots within the Deviation Probability Map

Günther Schuh, Stefan Rudolf, Christian Doelle, Michael Riesener
RWTH Aachen University, Germany

Knowledge Management Maturity and Organizational Performance in Project-Based Organizations: Initial Evidence from Indonesia

Budi Hartono[1], Vicky Ramadhani[1], Yunitha Ratnadilla[1], Nurul Indarti[1], Kah-Hin Chai[2]
[1]*Universitas Gadjah Mada, Indonesia*
[2]*National University of Singapore, Singapore*

Methodology for the Evaluation and Selection of the Suitability of Highly Iterative Product Development Methods for Individual Segments of an Overall Development Project

Günther Schuh, Stefan Rudolf, Frederic Diels
RWTH Aachen University, Germany

Indices to Critical Activities in Stochastic PERT Networks

Koichi Nakade, Takahito Narumi
Nagoya Institute of Technology, Japan

Systems Modeling and Simulation 1

7/12/2015 14:00 - 15:30
Room: MR336

Chairs: Michel Aldanondo
            Godwin Tennyson

Abstracts: see page 61

Modeling Driver Lane Selection Decisions in a Toll Plaza

Godwin Tennyson
Indian Institute of Management Tiruchirappalli, India

On Controllability of Discrete Systems in Probabilistic Spaces

Manuel De la Sen
University of the Basque Country, Spain

A Study for Establishing Ideal CRM System Function Structure

Te-King Chien[1], Hon-Yu Ma[2], Kai-Lun Hou[1]
[1]*National Formosa University, Taiwan*
[2]*Ten-In Food Co., Ltd, Taiwan*

Analysis of Dynamic Contact Mechanical Response and Contact Life of Low Speed Spur Gear

Yangyang Xin[1], Yunxia Chen[1], Rui Kang[1], Jiyu Wu[2]
[1]*Beihang University, China*
[2]*Pera Global Polytron Technologies Inc, China*

Thermal Estimations to Support Buildings Retrofit: Which Envelope to Manufacture?

Andres Felipe Barco Santa, Elise Vareilles, Michel Aldanondo
Université de Toulouse - Mines d'Albi, France

Vehicle Routing and Scheduling for Bushfire Emergency Evacuation

Shahrooz Shahparvari, Babak Abbasi, Prem Chhetri, Ahmad Abareshi
RMIT University, Australia

Healthcare Systems & Management 1

7/12/2015 16:00 - 17:30
Room: MR336

Chairs: Juha Puustjärvi
            Chibli Joumaa

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Posture Analysis in Ergonomic Study for Bus Station Design

Seng Fat Wong, Qili Chen
University of Macau, Macau

Selective Dissemination of Clinical Guidelines in Healthcare Communities

Juha Puustjarvi[1], Leena Puustjarvi[2]
[1]*University of Helsinki, Finland*
[2]*The Pharmacy of Kaivopuisto, Finland*

Deciding the Minimum Staffing Level in an Emergency Medical Center During Sandstorms

Chibli Joumaa, F. Al-Ajeel, L. Al-Thuwaini, M. Al-Qallaf, N. Al-Faraj, S. Al-Muzayan
American University of the Middle East, Kuwait

Green Logistics Optimization Model for Forward and Reverse Logistics Using Genetic Algorithm

Manoj Kumar, Dinesh Kumar
Indian Institute of Technology Roorkee, India

Capacity Allocation for Balancing Cost and Fairness in a Imaging Facility Setting

Liping Zhou, Zhibin Jiang, Na Geng, Xiuxian Wang
Shanghai Jiao Tong University, China

Analytical Framework to Establish Requisite Bed Capacity When Cohorting Paediatric Patients

Leslie Chia[1], Weidong Lin[2]
[1]*KK Women's and Children's Hospital, Singapore*
[2]*Temasek Polytechnic, Singapore*

Reliability and Maintenance Engineering 2

7/12/2015 14:00 - 15:30
Room: Summit 2

Chairs: Yoshinobu Tamura
           Qingpei Hu

Abstracts: see page 63

A Method of Reliability Assessment Based on Hazard Rate by Clustering Approach for Cloud Computing with Big Data

Yoshinobu Tamura[1], Yumi Nobukawa[2], Shigeru Yamada[2]
[1]*Yamaguchi University, Japan*
[2]*Tottori University, Japan*

Use of AHP for Risk Based Fatigue Degradation Inspection Analysis of Topside Piping on Offshore Production and Process Facilities

Arvind Keprate, R.M. Chandima Ratnayake
University of Stavanger, Norway

Evaluation of Product Maturity Based on Quality Characteristic

Xiaohong Wang, Yuxiang Li, Wenhui Fan, Jinquan Xuan, Lizhi Wang, Manman Mu
Beihang University, China

An Integrated Maintenance Optimization for Multi Parallel Machines Under Withdrawal Right

Tarek Askri, Zied Hajej, Nidhal Rezg
University of Lorraine, France

A PSO Identification Algorithm for Temperature Adaptive Adjustment System

Qian Zhang, Sa Wu, Qi Li
Beihang University, China

Reliability Modeling for Dependent Competing Failure Processes with Damage Self-Recovery Phenomenon

Hanlin Liu[1], Ruey-Huei Yeh[2], Baoping Cai[3]
[1]*City University of Hong Kong, Hong Kong SAR*
[2]*National Taiwan University of Science and Technology, Taiwan*
[3]*China University of Petroleum, China*

Reliability and Maintenance Engineering 3

7/12/2015 16:00 - 17:30
Room: Summit 2

Chairs: Masdi Muhammad
           Hennie Husniah

Abstracts: see page 64

Reliability Modeling of Successive Release of Software Using NHPP

Amir Hossein Soleiman Garmabaki[1], Abbas Barabadi[2], Yuan Fuqing[2], Jinmei Lu[2], Yonas Zewdu Ayele[2]
[1]*Luleå University of Technology, Sweden*
[2]*University of Tromsø - The Arctic University of Norway, Norway*

Work Place Factors Effect on Maintainability in Challenging Operating Conditions

Mojgan Aalipour[1], Abbas Barabadi[2]
[1]*LuleÅĄ University of Technology, Sweden*
[2]*University of Tromsø - The Arctic University of Norway, Norway*

Importance Measures for Control Systems with Degrading Components

Huadong Mo, Bin Liu, Xun Xiao
City University of Hong Kong, Hong Kong SAR

Reliability Analysis and Identification of Critical Components Using Markov Model

Gajanand Gupta, Rajesh P Mishra, Pranjal Jain
Birla Institute of Technology and Sciences, India

Suitability of Wiener Process Based Model for Prediction of Temperature Dependent Super Capacitor Availability

David Vališ[1], Ondrej Nováček[2], Jiri Chaloupka[3]
[1]*University of Defence, Czech Republic*
[2]*Masaryk University, Czech Republic*
[3]*Military Technical Research Institute, Czech Republic*

Methodology for Short-Term Performance Prognostic of Gas Turbine Using Recurrent Neural Network

Masdi Muhammad, Mohammadreza Tahan, Zainal Ambri Abdul Karim
Universiti Teknologi Petronas, Malaysia

Poster 1

7/12/2015 15:30 - 16:00
Room: Nicoll 1-2

p.66 **Research on the Structural Model of Quality Variations in Manufacturing and its Impact on Product Infant Failure Rate**

Linbo Wang, Yihai He, Zhenzhen He
Beihang University, China

p.66 **Maintainability Analysis of Equipment Using Point Process Models**

Abbas Barabadi[1], A.H.S. Garmabaki[2], Yuan Fuqing[1], Jinmei Lu[1]
[1]*University of Tromsø - The Arctic University of Norway, Norway*
[2]*Luleå University of Technology, Sweden*

p.66 **Performance Evaluation for Maximum Likelihood and Moment Parameter Estimation Methods on Classical Two Weibull Distribution**

Yuan Fuqing[1], Abbas Barabadi[1], Jinmei Lu[1], A.H.S. Garmabaki[2]
[1]*University of Tromsø - The Arctic University of Norway, Norway*
[2]*Luleå University of Technology, Sweden*

p.66 **Imperfect Repair Model for Complex Repairable System - A Literature Survey with Discussion**

Yuan Fuqing, Jinmei Lu
University of Tromsø - The Arctic University of Norway, Norway

p.66 **An Evaluation Method of Step-Down Stress Accelerated Life Test Based on Amsaa Model**

Jingyue Yang[1], Jun Yao[1], Yan Song[2], Honghua Hu[1], Yanlin Zhao[1]
[1]*Beihang University, China*
[2]*Institute of Space Radio Technology, China*

p.66 **Maintainability Management of Production Facilities in Complex and Challenging Operating Conditions**

Abbas Barabadi
University of Tromsø - The Arctic University of Norway, Norway

p.66 **Anisotropic Coupling Damage Model for Reliability Life Assessment**

Peng Lai, Weiwei Hu, Yufeng Sun
Beihang University, China

p.67 **A Novel Multi-Class Fault Diagnosis Approach Based on Support Vector Machine of Particle Swarm Optimization and Huffman Tree**

Fan Wu, Weiwei Hu, Yufeng Sun
Beihang University, China

Reliability and Maintenance Engineering 4

Chairs: Bimal Nepal
Baoping Cai

Hydrostatic Transmission System Failure Analysis and Utilization of Failure Knowledge: A Case Study

Shah Limon[1], Om Prakash Yadav[1], Jason Muscha[2], Bimal Nepal[3]
[1]North Dakota State University, United States
[2]Doosan Infracore Construction Equipment, United States
[3]Texas A&M University, United States

A Model for Degradation Prediction with Change Point Based on Wiener Process

Xiaojie Ke, Zhengguo Xu
Zhejiang University, China

Double Response Surface Method of Reliability Analysis for Mechanism

Chun-Yi Zhang, Jing-Ya Liu, Cheng Lu, Bao-Sheng Liu, Ai-Hua Wang, Ming-You Bai
Harbin University of Science & Technology, China

A Design Method for Force-Limited Vibration Testing Conditions

Ming Cheng[1], Hongjie Yuan[1], Zhenya Cao[1], Changyu Mo[2]
[1]Beihang University (BUAA), China
[2]Beijing CETC System Engineering Co. Ltd,, China

Strategy for Reliability Testing and Evaluation of Cyber Physical Systems

Zi Li, Rui Kang
Beihang University, China

Integrated Model of Production Plan and Preventive Maintenance Based on a Game-Theoretic Framework

Jiawen Hu, Zuhua Jiang
Shanghai Jiao Tong University, China

Reliability and Maintenance Engineering 5

Chairs: Om Prakash Yadav
Masdi Muhammad

A New Reliability Assessment Model for Power Electronic Modules

Xing Zhuang, Om Prakash Yadav
North Dakota State University, United States

A Simulation-Based Method for EMR Assessment of Aviation Electronic Products

Zenghui Yuan, Ying Chen, Lei Gao
Beihang University, China

Tolerance Limits for Gamma Distribution Based on Generalized Fiducial Method

Piao Chen, Zhi-Sheng Ye
National University of Singapore, Singapore

Passenger Perceptions on Reliability of an Inter-Campus Bus System

Michael Sizwe Mkwanazi, Charles Mbohwa, Takalani Nemarumane
University of Johannesburg, South Africa

Reliability Model of the Railway Transportation System With Respect to Hazard States

Franciszek Restel, Mateusz Zajac
Wroclaw University of Technology, Poland

Study on Reliability Assessment Method for Step-Down-Stress Accelerated Life Test Based on Bayesian Theory

Honghua Hu[1], Jun Yao[1], Jingyue Yang[1], Shuizhuang Miao[1], Shouzhen Wang[2]
[1]Beihang University, China
[2]The Second Artillery Equipment Research Institute, China

Reliability and Maintenance Engineering 6

Chairs: Qingpei Hu
Indra Gunawan

An Investigation on Imperialist Competitive Algorithm for Solving Reliability-Redundancy Allocation Problems

Hadi Khorshidi[1], Indra Gunawan[2], Agung Sutrisno[3], Sanaz Nikfalazar[1]
[1]Monash University, Australia
[2]Federation University, Australia
[3]Sam Ratulangi University, Indonesia

Bayesian Analysis for NHPP-Based Software Fault Detection and Correction Processes

Lujia Wang[1], Qingpei Hu[1], Min Xie[2]
[1]Chinese Academy of Sciences, China
[2]City University of Hong Kong, Hong Kong SAR

Optimal Maintenance Service Contract Involving Discrete Preventive Maintenance Using Principal Agent Theory

Eka Pakpahan[1], Bermawi P. Iskandar[2]
[1]Harapan Bangsa Institute of Technology, , Indonesia
[2]Bandung Institute of Technology, Indonesia

Marine Activities in the Arctic: The Need for Implementation of a "Buddy System"

Andreas Albrigtsen[1], Ove Tobias Gudmestad[2], Abbas Barabadi[1]
[1]University of Tromsø - The Arctic University of Norway, Norway
[2]University of Stavanger, Norway

Performance-based Aggregation of Expert Opinions for Reliability Prediction of Arctic Offshore Facilities

Masoud Naseri, Yuan Fuqing, Javad Barabady
University of Tromsø - The Arctic University of Norway, Norway

Optimal Preventive Maintenance for a Fleet of Dump Trucks with Two-Dimensional Lease Contract

Hennie Husniah[1], Udjianna S. Pasaribu[2], Bermawi P. Iskandar[2]
[1]Langlangbuana University, Indonesia
[2]Bandung Institute of Technology, Indonesia

Human Factors 2

8/12/2015 09:00 - 10:30
Room: MR328

Chairs: Chih-Hsing Chu
Lei Chen

Abstracts: see page 73

Virtual Try-On of Footwear in Augmented Reality Using RGB-D Cameras

Yu-I Yang[1], Chih-Kai Yang[1], Xin-Lan Liao[2], Chih-Hsing Chu[3]
[1]*National Tsing-Hua University, Taiwan*
[2]*Industrial Technology Research Institute, Taiwan*
[3]*National Tsing Hua University, Taiwan*

Hand Anthropometry of Czech Population

Marek Bures, Tomas Gorner, Blanka Sediva
University of West Bohemia, Czech Republic

Evaluation of Subjective Fatigue Tool – A Study Addressing Restaurant Employees in Indonesia

Rida Zuraida[1], Hardianto Iridiastadi[2]
[1]*Bina Nusantara University, Indonesia*
[2]*Bandung Institute of Technology, Indonesia*

Analysis of Performance Assessment for Teachers of Independent Colleges in China

Ai-Qun Yu
Beijing Technology and Business University, China

Oculomotor Response in Measuring Driving Fatigue

Maya Arlini Puspasari, Hardianto Iridiastadi, Iftikar Zahedi Sutalaksana, Yassierli Yassierli
Bandung Institute of Technology, Indonesia

A Study on Affective Feeling Evaluation for Automotive Wiper Switch Based on Multiple Regression Model

Noh-Hoon Park[1], Chang-Kyu Han[1], Hun Jung[1], Byung-Ki Jin[2], Myung-Hwan Yun[2]
[1]*Daesung Electric Corporation Co., Ltd, South Korea*
[2]*Seoul National University, South Korea*

Manufacturing Systems 3

8/12/2015 11:00 - 12:30
Room: MR328

Chairs: Alan Pilkington
Michel Aldanondo

Abstracts: see page 74

Development of a Rule Base and Algorithm for a Quotation Preparation Process: A Case Study with a VSM Approach

Dorota Stadnicka[1], R.M. Chandima Ratnayake[2]
[1]*Rzeszow University of Technology, Poland*
[2]*University of Stavanger, Norway*

Resolution of Deadlocks in a Robotic Cell Scheduling Problem with Post-Process Inspection System: Avoidance and Recovery Scenarios

Mehdi Foumani[1], Indra Gunawan[2], Kate Smith-Miles[1]
[1]*Monash University, Australia*
[2]*Federation University, Australia*

Potential for Improving Performance through Design for Environment (DFE) in a Ferrous Foundry

Ignatio Madanhire, Charles Mbohwa
University of Johannesburg, South Africa

Reducing Variability in Micro-Milling Process Using Six Sigma Methodology

Erika García-López, H. R. Siller, Ciro Rodriguez
Tecnologico de Monterrey, Mexico

Remote Supervision of Production Processes in the Food Industry

Jorge Lima, Francisco Moreira, Rui Sousa
University of Minho, Portugal

Redesign of the Production System: A Hard Decision-Making Process

Anabela Alves, Rui Sousa, J. Dinis Carvalho
University of Minho, Portugal

Human Factors 3

8/12/2015 13:30 - 15:30
Room: MR328

Chairs: Bingwen Yan
Chan Wai Lee

Abstracts: see page 75

Accessing Bank Finance in Relation to Human Capital, Gender and Race Among SMMEs in a Developing Economy

Pradeep Brijlal[1], Bingwen Yan[2]
[1]*University of the Western Cape, South Africa*
[2]*Cape Peninsula University of Technology, South Africa*

Drillis and Contini Revisited Using Correlation Analysis for Indonesian Adults Anthropometry

Markus Hartono, Linda Herawati Gunawan
University of Surabaya, Indonesia

An Improved System Safety Analysis Method Based on Accimap

Juanjuan Gao, Jin Tian, Tingdi Zhao
Beihang University, China

An Empirical Study of Intuition and its Context

Said Elbanna, Yasir Fadol
Qatar University, Qatar

Comparing Psychological Empowerment Levels of Field Employees in Small and Large Companies of the Oilfield Service Industry

Ngozi Onyemeh, Chan Wai Lee, K. A. Yap
University of Nottingham, Malaysia

Airport Security Screeners Reliability Analysis

Artur Kierzkowski, Tomasz Kisiel
Wroclaw University of Technology, Poland

Operations Research 4

Chairs: Christine Shoemaker
           Alyaa Abdelhalim

Global Sensitivity Analysis for Computationally Expensive Models Based on Radial Basis Function Interpolationand Optimization

Christine A. Shoemaker[1], Yilun Wang[2]
[1]National University of Singapore, Singapore
[2]Cornell University, United States

The Multiple Vehicle Inventory Routing Problem for Perishable Products

Alyaa Abdelhalim[1], Amr Eltawil[2], M. Nashat Fors[1]
[1]Alexandria University, Egypt
[2]Egypt-Japan University of Science and Technology (E-JUST), Egypt

The Robust Quay Crane Allocation for a Discrete Bulk Material Handling Port

Saurabh Pratap[1], Manoj Kumar B[1], Naoufel Cheikhrouhou[2], M. K. Tiwari[1]
[1]Indian Institute of Technology, Kharagpur, India
[2]University of Applied Sciences Western Switzerland, Switzerland

Solving the Robotic Cell Problem with Controllable Processing Times

Mohammed Al-Salem, Mohamed Kharbeche, Wael Khallouli, Mohamed Haouari
Qatar University, Qatar

Combinatorial Auction Algorithm with Price-Adjustment Mechanism for Airline Crew Scheduling Problems

Daiki Sasaki, Tatsushi Nishi
Osaka University, Japan

Multi-Objective Constrained Vehicle Refueling Planning: Complexity and Polynomial-Time Approximation Schemes

Shieu-Hong Lin
Biola University, United States

Big Data and Analytics

Chairs: Philipp Baumann
           Shino Iwami

Data Analysis of Social Community Reputation: Good Questions vs. Good Answers

Jwen Fai Low, Davor Svetinovic
Masdar Institute of Science and Technology, United Arab Emirates

Comparative Bibliographic Analyses of the Global and Japanese Databases in the Field of Solar Cell

Shino Iwami[1], Yasuhiro Yamashita[2]
[1]The University of Tokyo, Japan
[2]Japan Science and Technology Agency, Japan

Production Data Analytics for Production Scheduling

Qiyi Li[1], Lei Wang[1], Jingjing Xu[2]
[1]Shanghai Jiao Tong University, China
[2]East China Normal University, China

Index Tracking Using Data-Mining Techniques and Mixed-Binary Linear Programming

Oliver Strub[1], Philipp Baumann[2]
[1]University of Bern, Switzerland
[2]University of California, Berkeley, United States

Software Analytics Study of Open-Source System Survivability Through Social Contagion

Jwen Fai Low, Tennom Yathog, Davor Svetinovic
Masdar Institute of Science and Technology, United Arab Emirates

An AIS-Based Framework for Real Time Monitoring of Vessels Efficiency

Hongtao Chi, Giulia Pedrielli, Thomas Kister, Szu Hui Ng, Stephane Bressan
National University of Singapore, Singapore

Operations Research 5

Chairs: Babak Abbasi
           Siana Halim

Material Ordering with Discount Policy Integrated with a Project Scheduling Problem

Aria Shahsavar[1], Babak Abbasi[2], Nima Zoraghi[1]
[1]Islamic Azad University, Iran
[2]RMIT University, Australia

Development of OmniPlusTM Methodology for Sustaining Continuous Improvements

Amrik Singh Bhullar, Chin Wei Gan, Roland Lim, Ming Hon Toh, Bin Ma
Singapore Institute of Manufacturing Technology, Singapore

An Iterative Three-Stage Algorithm for the Pre-Marshalling Problem in Container Terminals

Zijie Ren, Canrong Zhang
Tsinghua University, China

Loading Sequencing with Consideration of Container Rehandling

Yanwei Shen, Canrong Zhang
Tsinghua University, China

An Iterated Local Search Algorithm for the Multi-Vehicle Covering Tour Problem

Yosuke Takada[1], Yannan Hu[1], Hideki Hashimoto[2], Mutsunori Yagiura[1]
[1]Nagoya University, Japan
[2]Tokyo University of Marine Science and Technology, Japan

Improving Fairness in Staff Assignment: An Approach for Lexicographic Goal Programming

Tom Rihm[1], Philipp Baumann[2]
[1]University of Bern, Switzerland
[2]University of California, Berkeley, United States

Systems Modeling and Simulation 2

8/12/2015 09:00 - 10:30
Room: MR330

Chairs: Suthep Butdee
Manuel de la Sen

An Optimization Approach for Congestion Management for Traffic Signal Control Systems via First-Order Hybrid Petri Nets

Ryotaro Yamazaki, Tatsushi Nishi
Osaka University, Japan

A Modeling and Simulation Approach for Support Network Considering Multi-Service Flows

Xiang Li[1], Lin Ma[1], Lan Peng[1], Jingfu Wang[2]
[1]Beihang University, China
[2]China Academy of Aerospace Standardization and Product Assurance, China

Dedicated Refurbishing Line Optimization by Simulation

Kevin Calvi[1], Sung Hoon Chung[1], Manthos Economou[2], Rohan Kulkarni[2], Ross Havens[1]
[1]Binghamton University, United States
[2]Google Inc., United States

Impact of Input Data Parameter Uncertainty on Simulation-Based Decision Making

L. Sathishkumar, Jayendran Venkateswaran
Indian Institute of Technology Bombay, India

Bayesian Network and System Thinking Modelling to Manage Water-Related Health Risks from Extreme Events

Edoardo Bertone[1], Oz Sahin[1], Russell Richards[2], Anne Roiko[1]
[1]Griffith University, Australia
[2]University of Queensland, Australia

Cold Forging Deformation Analysis for Stainless Steel Using DEFORM

Suthep Butdee, K. Uten
King Mongkut's University of Technology North Bangkok, Thailand

Project Management 2

8/12/2015 11:00 - 12:30
Room: MR330

Chairs: Ralph Riedel
Zhe Zhang

Management of "Soft" Success Factors in Projects

Mandy Thurm, Ralph Riedel, Egon Mueller
Chemnitz University of Technology, Germany

A Hybrid DEA-ANP Method for Measuring Complexity in Engineering Projects

Meng-Xuan Cui, Chao Fang
Wuhan University, China

Acceptance and Usage of ERP Systems: The Role of Institutional Factors in ERP Post-Implementation

Rajesri Govindaraju[1], Revi T. Salajar[2], Dissa Riandaso Chandra[1], Iman Sudirman[1]
[1]Bandung Institute of Technology, Indonesia
[2]Indonesian Ministry of Energy and Mineral Resources, Indonesia

A Bid & Auction Mechanism for Resource Management in Project Portfolios

Minghui Chen, Zhe Zhang
Nanjing University of Science and Technology, China

Causal Analysis of System Failures from IT Project Trouble Reports

Atsushi Shimoda
Chiba Institute of Technology, Japan

Assignment of Critical Path for a Building Site Based on Multicriteria Approach

Camila Famá[1], Luciana Alencar[2], Adiel Almeida[2]
[1]Instituto Federal de Educação, Ciência e Tecnologia da Paraíba (IFPB), Brazil
[2]Universidade Federal de Pernambuco, Brazil

Healthcare Systems & Management 2

8/12/2015 13:30 - 15:30
Room: MR330

Chairs: Na Geng
Amr Eltawil

MDP-Based Outpatient Scheduling for Multiple Examinations

Yang Liu[1], Na Geng[1], Yanhong Zhu[2]
[1]Shanghai Jiao Tong University, China
[2]Shanghai General Hospital, China

Solution Methods for the Planning and Scheduling Problems of Outpatient Chemotherapy Units

Mahmoud Heshmat, Amr Eltawil
Egypt-Japan University of Science and Technology (E-JUST), Egypt

A Weighted Multi-Objective Therapist Assignment Problem in Hong Kong

Meiyan Lin, Kwai-Sang Chin, Kwok Leung Tsui
City University of Hong Kong, Hong Kong SAR

Efficiency and Productivity of Publicly-Traded Bio-Pharmaceutical Companies in Taiwan

Yi-Hsing Lin, Chun-Fu Hong
National Quemoy University, Taiwan

Process Optimization for Operating Room Base on Pro-Model

Qinglian Lin[1], Long Liu[2], Duojin Wang[3], Yan Li[1]
[1]Xiamen University, China
[2]Tongji University, China
[3]University of Shanghai for Science and Technology, China

Workforce Modelling, Analysis and Planning: A Feasibility Study in a Local Nursing Home

P. P. L. Leung, C. H. Wu, G. T. S. Ho, W. H. Ip, W. L. Mou
The Hong Kong Polytechnic University, Hong Kong SAR

Information Processing and Engineering 2

8/12/2015 09:00 - 10:30
Room: MR332

Chairs: Christian Huemer
            Naraphorn Paoprasert

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A Standards Framework for Value Networks in the Context of Industry 4.0

Alexandra Mazak, Christian Huemer
Vienna University of Technology, Austria

Optimization of the Rubber Coagulation Process for Wastewater Treatment in Latex Separator Disc Cleaning System

Naraphorn Paoprasert[1], Sasitorn Srisawadi[2], Jomkwun Munnae[2], Vajawin Champeeratana[1], Nuttanit Techapreechawong[1]
[1]Kasetsart University, Thailand
[2]National Science and Technology Development Agency, Thailand

Modeling Tunnel Profile using Gaussian Process

Linmiao Zhang[1], Yong Lei[2], Nan Chen[1]
[1]National University of Singapore, Singapore
[2]Zhejiang University, China

Multi-Resolution Modeling on Complex System Integrated Logistic Support

Fang Li, Peng Di, Yifan Xu, Jianwei Lv
Naval University of Engineering, China

Practical Design of 13.56MHz Near Field Communication (NFC) and Radio Frequency Identification (RFID) Antenna using Ferrite Sheet on Metallic Surface by Network Analyzer

Siow Shyong Lau
Temasek Polytechnic, Singapore

An Action Design Research on Development and Deployment of a Computer- Based Group Discussion Support Tool for Achieving Consensus and Culture Change at an Educational Institution

Jaclyn Lee[1], Jos van Hillegersberg[2], Kuldeep Kumar[2]
[1]Singapore University of Technology and Design, Singapore
[2]University of Twente, Netherlands

Quality Control and Management 3

8/12/2015 11:00 - 12:30
Room: MR332

Chairs: Ville Isoherranen
            Jianjun Wu

Abstracts: see page 83

Operational Excellence Driven by Process Maturity Reviews: A Case Study of the ABB Corporation

Ville Isoherranen, Minna Katariina Karkkainen, Pekka Kess
University of Oulu, Finland

Kriging Surrogate Model for Compliant Mechanism Six Sigma Robust Optimization Design

Jianjun Wu, Liang Qi Wan, P. F. Nie
Jiangxi University of Science and Technology, China

A Study of Multivariate Process Capability Indices in Manufacturing Processes

Subhas Chandra Mondal
Indian Institute of Engineering Science and Technology, India

Confidence Based Quality Evaluation for Total Manufacturing Process Using Comprehensive Process Capability

Kongjun Gao[1], Yihai He[2], Linbo Wang[2]
[1]91872 PLA Troops, China
[2]Beihang University, China

COQ Math Model Case Study for Self-Brand Automobile Industry

Zhou Fuli, Wang Xu, Chen Shan, Ni Lin
Chongqing University, China

Statistical Monitoring of Longitudinal Categorical Survey Data

Chen Zhang, Nan Chen
National University of Singapore, Singapore

Quality Control & Management 4

8/12/2015 13:30 - 15:30
Room: MR332

Chairs: Dinh Son Nguyen
            Liang Gao

Abstracts: see page 84

Application of Bayesian Networks for Product Quality Management in a Multistage Manufacturing Process

Dinh Son Nguyen
The University of Danang, Viet Nam

Probabilistic Analytical Target Cascading Combined with Kriging Metamodel for Multidisciplinary Robust Design Optimization

Fengxiang Wang, Mi Xiao, Liang Gao
Huazhong University of Science and Technology, China

An Improved Switching Rule in Variable Sampling Interval Hotelling

Yiing Chee Tan, Ming Ha Lee, Winnie Wei Wan Lam
Swinburne University of Technology Sarawak Campus, Malaysia

Comprehensive Wafer Level Package Die Processing Service Quality Control Enhancement

John Qiao, Morn Jin, Wenwen He, Wei-Ting Kary Chien, Shirley Zhao
Semiconductor Manufacturing International Corporation, China

Key Performance Indicators for Operational Quality in the Oil and Gas Industry A Case Study Approach

Ngozi Onyemeh, Chan Wai Lee, Muhammad Iqbal
University of Nottingham, Malaysia

Production Planning and Control 2

Chairs: Laith Hadidi

Multi-Objective Optimization for Inspection Planning Using NSGA-II

Elnaz Asadollahi-Yazdi[1], Alaa Hassan[1], Ali Siadat[1], Jean-Yves Dantan[1], Ali Azadeh[2], Abbas Keramati[2]
[1]*Arts et Métiers Paris Tech, France*
[2]*University of Tehran, Iran*

Improving Overall Equipment Effectiveness (OEE) Through Integration of Maintenance Failure Mode and Effect Analysis (Maintenance-FMEA) in a Semiconductor Manufacturer: A Case Study

Kuan Eng Chong[1], Kam-Choi Ng[2], Gerald Guan Gan Goh[3]
[1]*Technical University Malaysia, Malaysia*
[2]*Infineon Technologies, Malaysia*
[3]*Multimedia University, Malaysia*

Gap Analysis of Required and Available Capacity

Ryanto Hartono, Laurence Laurence
University of Pelita Harapan, Indonesia

A Mathematical Model to Determine the Optimal Size of a Product Line from the Perspective of Manufacturing Companies

Jungju Park[1], Ji Hyoun Lim[2], Jeonghoon Mo[1]
[1]*Yonsei University, South Korea*
[2]*Ulsan National Institute of Science and Technology, South Korea*

Spiral-Evolutional Production Scheduling System

Shigeru Fujimura, Wei Weng
Waseda University, Japan

Automating Scheduling Tasks; Experience of a Real Case

J.C. de Man, Taravatsadat Nehzati, Emrah Arica, Kasper Kiil
Norwegian University of Science and Technology, Norway

Facilities Planning & Management

Chairs: Markus Hartono
            Danping Lin

Evaluating Design Alternatives of Constructed Storm-Water Treatment Wetlands

Oz Sahin, Edoardo Bertone, Matthew Baker
Griffith University, Australia

Modeling of Periodic Location Routing Problem with Time Window and Satisfaction Dependent Demands

Nasim Nasherahkami[1], Mahdi Bashiri[2], Jafar Bagherinezhad[3]
[1]*Payam Noor University, Iran*
[2]*Shahed University, Iran*
[3]*Alzahra University, Iran*

Ground Crew Rostering for the Airport Check-In Counter

Danping Lin[1], Zhuo Xin[2], Youfang Huang[3]
[1]*Shanghai Maritime University, China*
[2]*School of Management, Xiamen University, China*
[3]*Engineering Research Centre of Container Supply Chain Technology, Shanghai Maritime University, China*

The Effect of Soft Power Investment on Shanghai Port Competitiveness Using DEA

Danping Lin, Daofang Chang, Zhen Wang
Shanghai Maritime University, China

Performance Improvement of Oil and Gas Industry via Lean Concept: A Case Study from Valves Requisition

R.M. Chandima Ratnayake, M. Osman Chaudry
University of Stavanger, Norway

Engineering Education and Training

Chairs: Chien-Sing Lee
            James K. C. Chen

Creation of a Mentoring Program for Improving the Education of Industrial Engineers

Maria da Gloria Diniz de Almeida[1], Andreia Maria Pedro Salgado[1], Gessica Naira Diniz Baronto[2]
[1]*Sao Paulo State University, Brazil*
[2]*Rio de Janeiro State University, Brazil*

Knowledge Loss at Institute of Higher Learnings in Technologies in India

Kalyan Kumar Bhattacharjee, Ravi Shankar, M. P. Gupta
Indian Institute of Technology Delhi, India

Educating Tomorrows Engineers: Reinforcing Engineering Concepts Through Virtual Reality (VR) Teaching Aid

Opeyeolu Laseinde[1], Samuel Adejuyigbe[2], K. Mpofu[1], Harold Campbell[1]
[1]*Tshwane University of Technology, South Africa*
[2]*Federal University of Technology, Nigeria*

Systems Thinking - Innate or Learned? Recent Study Findings

Sigal Koral-Kordova, Moti Frank
HIT- Holon Institute of Technology, Holon, Israel

A Framework for Human Collaborative Robots, Operations in South African Automotive Industry

Pheladi Masinga, Harold Campbell, J.A. Trimble
Tshwane University of Technology, South Africa

The Study on Competency Characteristic of JAVA Software Engineer of the Internet Enterprise

Anshi Wang[1], Xin Li[2], Yiwen Chen[2]
[1]*University of Chinese Academy of Sciences, China*
[2]*Chinese Academy of Sciences, China*

Technology and Knowledge Management 2

8/12/2015 09:00 - 10:30
Room: MR335

Chairs: James K. C. Chen
           Michael Gepp

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Studying the Continuance Intention and Success Factor of E-Learning Systems

James K. C. Chen[1], Nila Armelia Windasari[2], Sheng-Lung Lee[1]
[1]Asia University, Taiwan
[2]National Tsing Hua University, Taiwan

Study on Technological Innovation Efficiency Based on Dea-Malmquist: Empirical Analysis of 15 Chinese Listed Pharmaceutical Manufacturing Firms

Zhongyuan Xu, Wei Chen
Harbin Engineering University, China

Patent Survival Analysis of China's Communication Industry

Suli Zheng, Xiaowei Hu, Shuang Hu
China Jiliang University, China

Strategy Framework for Technology Platforms within the Context of Diversified Companies

Günther Schuh[1], Simon Ryschka[2]
[1]RWTH Aachen University, Germany
[2]Fraunhofer Institute for Production Technology IPT, Germany

Research of Continue Using Behavior of Electronic Knowledge Repositories Basing on a Comprehensive Model

Shujuan Zhang, Zhongqu Tian, Yajuan Jin
Northwestern Polytechnical University, China

Engineer-to-Order Companies are Reserved on Adoption of Current Engineering Trends – An Empirical Study

Michael Gepp[1], Philipp Goelzer[2], Boris Grobholz[1]
[1]Siemens AG, Germany
[2]University Erlangen-Nürnberg, Germany

Technology and Knowledge Management 3

8/12/2015 11:00 - 12:30
Room: MR335

Chairs: Ataur Rahman
           Panagiotis Ganotakis

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The Prospects of Panel Style Nano-Battery Technology for EV/HEV

Ataur Rahman, Mahbubur Rashid, A.K.M. Mohiuddin, Hannan Moktar
International Islamic University Malaysia, Malaysia

The Role of Universities in Fostering Knowledge-Intensive Start-Ups -According to German Experiences-

Reza Asghari, Oktay Erol
Braunschweig University of Technology, Germany

Effect of Domestic and Foreign Technological Collaborations on Different Level of Product Innovation Radicalness

Panagiotis Ganotakis, M. Kafouros
University of Wollongong in Dubai, United Arab Emirates

ERP Pre-Implementation Framework for Higher Education Institution: A Case Study in Purdue University

Lin Qian, Edie Schmidt, Regena Scott
Purdue University, United States

Necessity of the Consideration of Strategic Aspects in Variant Decisions of Modular Product Architectures

Ann-Katrin Weiser[1], Bernd Baasner[2], Jivka Ovtcharova[1]
[1]Karlsruhe Institute of Technology, Germany
[2]Bosch Thermotechnik GmbH, Germany

How Much is Too Much – Equilibrium Points for Good Export and R&D Intensity: Data of World Top 2000 Companies

Mait Rungi, Andres Ida
Tallinn University of Technology, Estonia

Service Innovation and Management 2

8/12/2015 13:30 - 15:30
Room: MR335

Chairs: Pei-Lee Teh
           Shin-Guang Chen

Abstracts: see page 90

Are Older Adults Really That Different? Some Insights from Gerontechnology

Weng Marc Lim[1], Pei-Lee Teh[1], Pervaiz Khalid Ahmed[1], Alan H.S. Chan[2], Soon-Nyean Cheong[3], Wen-Jiun Yap[3]
[1]Monash University, Malaysia
[2]City University of Hong Kong, Hong Kong SAR
[3]Multimedia University, Malaysia

Sustainable Innovation: A Consumer Perspective

Bjoern Frank[1], Boris Herbas Torrico[2], Shane J. Schvaneveldt[3]
[1]Sophia University, Japan
[2]Bolivian Catholic University San Pablo, Bolivia
[3]Weber State University, United States

A Study on Flight Combination in Terms of Timed Stochastic-Flow Network

Shin-Guang Chen
Tungnan University, Taiwan

The Quality Function Deployment (QFD) – Based Evaluation of Malang Waste Bank Management

Lalu Tri Wijaya Nata Kusuma, Annisaa Adi Ramadhan, Harizka Dwi Putri Anggriyanti
University of Brawijaya, Indonesia

Performance Based Contracting for the Manufacturing Industry by Using Integrated Platform and Dynamic Pricing Model

Lindawati Lindawati[1], Aldy Gunawan[2]
[1]SAP Innovation Center Singapore, Singapore
[2]Singapore Management University, Singapore

Comparison of IT Services Organizational Units on the basis of Human Capital Measures

Mangesh Gharote, Abhay Sodani, Girish Palshikar, Rajiv Srivastava
Tata Consultancy Services Limited, India

Supply Chain Management 3

8/12/2015 09:00 - 10:30
Room: MR336

Chairs: Premaratne Samaranayake
        Haiyan Xu

Green Supply Chain Management, Triple Bottom Line, and Organizational Theory – Prioritization with Fuzzy AHP Method

Poomporn Thamsatitdej[1], Metinee Jongpaiboon[2], Premaratne Samaranayake[3], Tritos Laosirihongthong[2]
[1]Mahidol University, Thailand
[2]Thammasat University, Thailand
[3]University of Western Sydney, Australia

A Model to Evaluate Risk Propagation Considering Effect of Dynamic Risk Information Sharing and Multi-Sourcing in Supply Chain Networks

Hai-Yan Xu[1], Xiuju Fu[1], Loganathan Ponnambalam[1], Akira Namatame[2], Xiao Feng Yin[1], Rick Siow Mong Goh[1]
[1]Institute of High Performance Computing, Singapore
[2]National Defense Academy, Japan

Waste Reduction of Returnable Packaging: A Case Study of Reverse Logistics in an Auto Parts Company

Nophanut Katephap, Sunpasit Limnararat
King Mongkut's Institute of Technology Ladkrabang, Thailand

A Solution Procedure based on Lagrangian Relaxation for Supply Chain Planning Problem with CSR Investment

Takuya Aoyama, Tatsushi Nishi
Osaka University, Japan

The Governance of Cloud Based Supply Chain Collaborations

Dissa Riandaso Chandra, Jos van Hillegersberg
University of Twente, Netherlands

Mitigating Risks in the Sourcing of Transportation Services: A Real Option-Based Approach

Nicola Costantino, Roberta Pellegrino, Danilo Tauro
Politecnico di Bari, Italy

Safety, Security & Risk Management 2

8/12/2015 11:00 - 12:30
Room: MR336

Chairs: Yoshinobu Tamura
        Om Prakash Yadav

Risk Assessment Method for Cybersecurity of Cyber-Physical Systems Based on Inter-Dependency of Vulnerabilities

Wenbo Wu, Rui Kang, Zi Li
Beihang University, China

Performance-Based Risk Management Systems (PBRMS) in the Arctic Drilling Waste Handling Operation

Yonas Zewdu Ayele, Abbas Barabadi, Javad Barabady
University of Tromsø - The Arctic University of Norway, Norway

The Improved Methodology of Safety Assessment with System Simulation

Yabing Guo, Wenbingg Chang, Shenghan Zhou
Beihang University, China

Improved Condition Monitoring System to Protect Railway Axle Bearing Safety from Electric Corrosion

Yuan Fuqing, Jinmei Lu
University of Tromsø - The Arctic University of Norway, Norway

Extreme Waves Generated in a Future Arctic Ocean

Dimitrios Kostopoulos, Ove Tobias Gudmestad
University of Stavanger, Norway

Life Assessment of Organic Coating Based on Accelerated Degradation Test and Modeling

Liwei Sun, Xiaohui Wang, Guilin Zhang, Qingming Xu
Beihang University, China

Supply Chain Management 4

8/12/2015 13:30 - 15:30
Room: MR336

Chairs: Nunzia Carbonara
        Egon Mueller

Assessing the Benefits of the Product Postponement Strategy to Mitigate Supply Chain Risks: A Real Options-Based Computational Model

Nunzia Carbonara, Nicola Costantino, Roberta Pellegrino
Politecnico di Bari, Italy

A Taxonomy of Integrative Technologies

Ping-Kuo Chen
Aletheia University, Taiwan

The Mechanism of China Textile Industry Shift: Strategies and Behaviors of Buyers and Suppliers

Caixia Chen, Jun Yang, Yixiong Yang, Qingliang Gu
Donghua University, China

Service Oriented Architecture Led Producer Centric Supply Chain: Learning in Indian Context

Harekrishna Misra
Institute of Rural Management Anand, India

Quantifying Disruptions Propagation in a Supply Chain

Chin Sheng Tan[1], Puay Siew Tan[1], Siang Guan Lee[2]
[1]Singapore Institute of Manufacturing Technology, Singapore
[2]Nanyang Technological University, Singapore

Supply Chain Management Information Systems and Organisational Performance in Economic Turbulent Environments

Maria Argyropoulou[1], Roula Michaelides[2], Iain Reid[3], George Ioannou[1]
[1]Athens University of Economics and Business, Greece
[2]University of Liverpool, United Kingdom
[3]University of Huddersfield, United Kingdom

Poster 2

p.94 **LP-Relaxation-Simulated Annealing Manpower Scheduling Algorithm for Service Industry**

Hendra Teja Wirawan, Ping Chong Chua
Singapore Institute of Manufacturing Technology, Singapore

p.94 **Feature Model Augmentation with Sentiment Analysis for Product Line Planning**

Feng Zhou, Roger Jiao
Georgia Institute of Technology, United States

p.95 **Identification of Critical Success Factors for Emerging Market Entry Planning Processes in the Automotive Industry**

Thillai Sivakumaran[1], Florian Köhne[2], Michael Toth[3]
[1]*Technical University of Dortmund, Germany*
[2]*Audi AG, Germany*
[3]*Bochum University of Applied Sciences, Germany*

p.95 **A Behavioral Choice Model for Product Demand Estimation**

Shuli Wu, Songlin Chen
Nanyang Technological University, Singapore

p.95 **Simulation of Fire Evacuation in a High-Rise Office Building**

Bai Wen, Huo Yan, Zou Gaowan, Gao Ye
Harbin Engineering University, China

p.95 **Development of Firing on Board System of an Armored Vehicle Using Active Front Wheel Steering System**

Vimal Rau Aparow, Khisbullah Hudha, Megat Mohamad Hamdan Megat Ahmad, Shohaimi Abdullah
National Defense University of Malaysia, Malaysia

p.95 **Credit Risk Assessment Model of Small and Medium-Sized Enterprise Based on Logistic Regression**

Hui Sun, Mingyuan Guo
Tianjin University, China

p.95 **A Time-Variant Reliability Modeling and Analysis Method of Multi-State Complex Electromechanical System**

Qian Wang, Jianguo Zhang, Linjie Kan, Pidong Wang
Beihang University, China

p.95 **Design and Development of GUI Based Model for Fault Diagnosis of Induction Motor**

Anant G. Kulkarni[1], Mohammad Farukh Qureshi[2], Manoj Jha[3], Vivekkant Jogi[4]
[1]*Dr. C. V. Raman University, India*
[2]*Government Polytechnic, India*
[3]*Rungta Engineering College, India*
[4]*Shri Hari Advance Nano Science Pvt. Ltd., India*

p.96 **AHP Based Weighting System for BIM Implementation & Assessment Framework**

Keyu Chen, Haijiang Li
Cardiff University, United Kingdom

p.96 **A New Approach in Considering Vagueness and Lack of Knowledge for Selecting Sustainable Portfolio of Production Projects**

V. Mohagheghi[1], S. M. Mousavi[1], Ali Siadat[2]
[1]*Shahed University, Iran*
[2]*Arts et Métiers Paris Tech, France*

p.96 **Project Management Approach for Turbine Maintenance in Power Utility Plants: The Case of a South African Maintenance Company**

Teddy Mtembi, Grace Kanakana
Tshwane University of Technology, South Africa

p.97 **Triggering an Internal Service Innovation in Manufacturing Firms**

Yang Yang Zhao, John Kafka
Buskerud and Vestfold University College, Norway

p.97 **Enterprise's WeChat Use and its Impact on Firm Performance – From the Perspective of Value Co-Creation**

Jifan Ren, Ruo Nan Li
Harbin Institute of Technology Shenzhen Graduate School, China

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Wilson Maladzhi
University of South Africa, South Africa

p.97 **TRIZ-PUGH Model, New Approach for Creative Problem Solving and Decision Making**

Jakrapong Karnjanasomwong, Natcha Thawesaengkulthai
Chulalongkorn University, Thailand

p.97 **Evaluation of the Reliability Performance of an Inter-Campus Bus System**

Michael Sizwe Mkwanazi, Charles Mbohwa, Takalani Nemarumane
University of Johannesburg, South Africa

p.98 **The Impact of Plan Form of Circulation Systems in Large-Scale Environments on Space Cognition: Case Study in Two Shopping Malls in China**

Rui Zhao, Xin Li, Yiwen Chen
Institute of Psychology, Chinese Academy of Science, Beijing University of Technology, China

p.98 **The Processing Method of Temperature Drift Data for Prediction Based on Wavelet Theory**

Lizhi Wang, Xinlei Zhao, Xiaohong Wang, Xinlan Li, Yuxiang Li
Beihang University, China

p.98 **Utilizing Product Configuration Systems for Supporting the Critical Parts of the Engineering Processes**

Katrin Kristjansdottir, Sara Shafiee, Lars Hvam
Technical University of Denmark, Denmark

p.97 **The Information Security in Semiconductor Industry**

Shirley Zhao, Sherry Zhu, Sherry Guo
Semiconductor Manufacturing International Corporation, China

p.98 **Real-Time Scheduling Home Caregivers Based on Disruption Management**

Biao Yuan, Ran Liu, Zhibin Jiang
Shanghai Jiao Tong University, China

p.98 **Efficiency of Publicly-Traded Medical Device Companies in Taiwan – An Analysis Using Window-DEA**

Chun-Fu Hong, Yi-Hsing Lin
National Quemoy University, Taiwan

p.98 **Constructing a Framework to Manage High Utilizers In Health and Social Care**

Tomi Malmstrom, Antti Peltokorpi, Markus Lappalainen
Aalto University, Finland

Abstracts

Session	Reliability and Maintenance Engineering 1
Date	7/12/2015
Time	11:15 - 12:45
Room	MR323
Chairs	David Valis, Baoping Cai

Using Oil Quality Indicators as System Technical Life Characteristics and Maintenance Optimizers

David Vališ[1], Libor Zak[2], Jiri Chaloupka[3]
[1]University of Defence, Czech Republic
[2]University of Technology, Czech Republic
[3]Military Technical Research Institute, Czech Republic

Using the information from oil which is a part of a technical system has been presented a couple of times. The results introduced so far usually dealt with wear metals which get into the oil. However, this paper is based on a different approach. We have assessed oil particles which primarily determine oil quality. These are Anti-Oxidant and Anti-Wear Particles (AOWP). These particles are additives in the oil and their amount depends both on operating time and calendar time. The aim of the article is to introduce selected mathematical approaches used assess how the number of these particles affects residual useful life (RUL) and maintenance optimizing.

An Improved Prediction Model for Equipment Performance Degradation based on Fuzzy-Markov Chain

Wen-zhu Liao, Dan Li
Chongqing University, China

In this paper, a practical prognostics tool is given to better realize effective condition-based maintenance. First, a brief overview of prognostics techniques is provided. Accordingly, a prediction model combining fuzzy sets and Markov Chain is proposed for equipment performance degradation. This model can improve these traditional state division methods based on personal subjective experience, and increase the prediction accuracy. Then, a numerical example is provided in which the exhaust gas temperature margin is considered as the performance indicator. Through the computation results, it can be verified that the Fuzzy-Markov chain simplifies the calculation process, and achieves accurate prediction results with small sample and incomplete information. Moreover, compared with linear regression model, nonlinear regression model and GM (1, 1) model, the computation results illustrate that this prediction model performs better in dealing with the degradation data with high nonlinearity and random fluctuation.

Implementation of System-Based Hazard Analysis on Physical Safety Barrier: A Case Study in Subsea HIPPS

Andika Rachman, R.M. Chandima Ratnayake
University of Stavanger, Norway

Physical safety barriers are provided in industrial systems to prevent/control/mitigate undesired events. However, despite their highly redundant and reliable design, multiple barriers can be penetrated simultaneously as shown by the Deepwater Horizon blowout accident. Their functionality was degraded, not only because of components failures, but also due to management and organizational factors, e.g. inadequate operator training, ineffective maintenance, and poor safety culture. These factors are sourced from management's decisions and actions to prioritize profitability over safety, which covertly generate hazards to the system. However, conventional hazard analyses are unable to identify these hazards. A hazard analysis called System-Theoretic Process Analysis (STPA) is believed to enable the identification of hazards that are rooted from management's unsafe decisions and actions, thus preventing degradation of physical safety barriers in a broader perspective. This paper will discuss the application of STPA for the High-Integrity Pressure Protection System (HIPPS) in subsea production system.

Identifying Critical Success & Failure Factors for TQM Implementation: Extract from Case Studies

Vimal Kumar, R. R. K. Sharma
Indian Institute of Technology Kanpur, India

Seminal article [14] on "Building theories from Case Study Research" has motivated researchers of diverse areas to adopt case study methodology to build concepts and theories and case research on TQM implementation concepts is no exception. The purpose of this paper is to identify the critical success & failure factors for TQM Implementation from the real case analysis. It has been found that successful implementation of TQM system has taken the organizations to new heights of profitability while failure has often led organization out of the market. The criterion used to select the company for our case study was that each of the companies implemented TQM vigorously. The findings of the study provide critical input for TQM implementation with firms being more proactive and better prepared for TQM implementation. The successful TQM implementation set comprised seven companies and failed one with five companies.

A Reliability Analysis Framework Based on Time-Varying Dynamic Bayesian Network

Yu Liu[1], Baoping Cai[2]
[1]City University of Hong Kong, Hong Kong SAR
[2]China University of Petroleum, China

In the last decade, Bayesian Networks have become more and more popular in solving statistical problems. This method also attracts a lot of attention in reliability analysis community. In this paper, a time-varying Dynamic Bayesian Network modeling framework extended from basic Dynamic Bayesian Network model was proposed to analysis the reliability of non-stationary system. And the model is illustrated with the reliability analysis of PV power system.

A Framework of Bayesian Lifetime Demonstration Based on Degradation

Zhengqiang Pan, Tianyu Liu, Quan Sun, Jing Feng
National University of Defense Technology, China

In order to validate the lifetime of long-life product, the concept of lifetime demonstration testing (LDT) based on degradation is presented in this paper. For shortening test time as far as possible, the prior information of similar products is considered. Therefore, a framework of Bayesian lifetime demonstration based on degradation is developed by considering the prior information of products. Firstly, we present a Bayesian reliability model based on a generalized degradation process, and take a linear form for example to infer the posterior cumulative distribution function (CDF). Due to the prior information considered, the Bayesian sequential probability ratio test (SPRT) method is used to demonstrate lifetime of the product at test censored time. And the corresponding decision rules are given under the producer's risk α and consumer's risk β. Finally, for an illustration of the proposed model and method, an example about the self-healing metallized film pulse capacitors is discussed and some interesting and exciting analytical results are presented.

Cleaner Production as a Tool to Mitigate Pollution in Leather Processing: Case Study

Ignatio Madanhire, Charles Mbohwa
University of Johannesburg, South Africa
This research study explored environmental pollution problems in the leather processing industry. It presents plant-level assessment results and possible benefits of cleaner production (CP) in various leather processing stages. Chemicals which were used for hide tanning would find their way into the environment resulting in the presence of salts in the tannery effluent. This work sought to reduce salts in the effluents by incorporating a number of CP measures including installation of a chilling unit to the tannery system.

Multivariate Bayesian VSI Control Chart

Xing Zhang, Jian Liu, Chao Tan
Hunan University, China
In this paper, research was conducted on a multivariate Bayesian variable sampling interval (VSI) control chart to address the problem of insufficient research in the area of Bayesian multivariate control charts with variable parameters. Bayesian multivariate control chart was constructed and control strategies on variable sampling interval and variable control limits were designed. Cost model was built and the corresponding parameters of cost and control chart were determined through researching in enterprise. Monte Carlo stochastic simulation was adopted to verify the economical and statistical advantages of Bayesian multivariate control chart. This study provides supports for in-depth study on Bayesian multivariate control chart with variable parameters.

A New Method of Cost Contingency Management

Mohammed Wajdi Hammad, Alireza Abbasi, Michael J. Ryan
University of New South Wales, Australia
Controlling the progress and performance of a project is pivotal to achieve its planned goals. Schedule and cost are often used to make a baseline for managing projects' progress, but there are always uncertainties in planning and estimating the schedule and cost of projects. Therefore, a contingency reserve is needed to manage uncertainties and risks. In this paper, we present a new cost contingency management method. To show the benefit of our new proposed method, it is applied to a real-life bridge maintenance project, and then it is compared with an existing cost contingency management method. The comparison shows that our new method can help the project manager obtain more detailed information about the financial status of the project.

An Empirical Study of the Impact of Project Factors on Software Economics

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Software economic analysis supports practitioners making decisions during the development process. Effective analysis requires considering higher productivity and quality while maintaining lower effort and time-to-market for business demands. Former studies have identified multiple factors of team and project that determine software economics. However, there is serious conclusive inconsistency. Experts are calling for more empirical evidence with objective data. This study aims at validating the empirical relationships between team/project factors and software economic measurement, including productivity, quality, effort, and time-to-market. The data analysis bases on a renowned dataset, ISBSG. Our findings indicate multiple factors, including team size, language type, and organization type, turn out to have a significant impact on software economics.

Two-Way Substitution Effects on Inventory in Configure-to-Order Production Systems

Anna Myrodia, Martin Bonev, Lars Hvam
Technical University of Denmark, Denmark
In designing configure-to-order production systems for a growing product variety, companies are challenged with an increased complexity for obtaining high productivity levels and cost-effectiveness. In academia several optimization methods and conceptual frameworks for substituting components, or increasing storage capacity have been proposed. Our study presents a practical framework for quantifying the impact of a two-way substitution at different production stages and its impact on inventory utilization. In a case study we quantify the relation between component substitution, and inventory capacity utilization, while maintaining the production capacity as well as the external product variety.

An Evaluation of Life Long Fly Ash based Geopolymer Cement and Ordinary Portland Cement Costs Using Extended Life Cycle Cost Method in Australia

Clifford Chan, D. Thorpe, M. Islam
The University of Southern Queensland, Australia
Numerous researchers focused on the life cycle costing assessment of procurement events for facilities and they have less concerned material and manufacturing costs, particular in cement industry, which has been identifying as one of the major air pollution sources, intensively used raw materials and energy in terms of cost. This paper adapted and extended the life cycle cost assessment including capital, maintenance, manufacture, material, disposal, environment and residue value based on 20 years life-long for evaluation fly ash based geopolymer cement and ordinary Portland cement manufacture. The outcome of production of fly ash based geopolymer cement is more expensive than ordinary Portland cement manufacture using proposed extended life cycle cost methods.

Session	Intelligent Systems
Date	7/12/2015
Time	16:00 - 17:30
Room	MR323
Chairs	Linda Zhang, Babak Abbasi

Implications of Product Configurator Applications: An Empirical Study

Linda Zhang[1], Petri Helo[2], Arun Kumar[3], Xiao You[4]
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[3]RMIT University, Australia
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Product configurators have been widely applied in practice for delivering a right amount of product variety. Based on a survey, this study empirically investigates the implications of product configurator applications for companies' business activities. The purpose is to help companies better plan actions and make changes to embrace the implementation of product configurators with an understanding of the application implications. The results indicate (i) how product configurator applications affect companies' business activities, (ii) the difficulties in designing, developing, and using product configurators, and (iii) the potential barriers preventing companies from effectively applying product configurators in the future. With the results, we further highlight several improvement areas for companies to investigate in order to reap, to the largest extent, the benefits of implementing product configurators.

Agent-Based General Environment with Market Mechanism

Bingcong Zeng
HP Enterprise, Hong Kong SAR

The rapid development of e-commerce calls for an immediate need of an autonomous and robust agent system with market intelligence that can offer various types of services to both buyers and sellers. In this paper, Agent-Based General Environment with Market Mechanism (ABGEM) is proposed, with intention to provide a feasible solution to it. The key elements of ABGEM include an agent interaction model inspired from the idea of "Forum", a set of standard agent types with market mechanism, and the related rules that instruct agents' activities. To test the feasibility of the proposed solution, an application is developed on ABGEM, simulating two market scenarios. In the experiments, special interest is placed on agent learning of pricing strategies. The result generates valuable findings, which demonstrate the great potential of ABGEM in practical use

Functional and Technological Evolution of Enterprise Systems: An Overview

Kourosh Yazdani Rashvanlouei[1], Rainer Thome[1], Khashayar Yazdani[2]
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A considerable demand of real-time business intelligence analysis persuade enterprise application vendors to cope with state-of-the-art computing technologies such as cloud computing and in-memory data management systems, to provide business owners with systems "predicting the future". A general review and study of enterprise systems' history helps to better understand what such systems will be in close future. This abstract review demonstrates that the evolution of these software solutions has two major aspects; functional evolution and computation revolutions.

A Binary Firefly Algorithm for Knapsack Problems

Kaushik Kumar Bhattacharjee, Sarada Prasad Sarmah
Indian Institute of Technology Kharagpur, India

Knapsack problems are one of the classical NP-hard problem and it offers many practical applications in vast field of different areas. Several traditional as well as population based metaheuristic algorithms are applied to solve this problem. In this paper we introduce the binary version of firefly algorithm (CSA) for solving knapsack problems, specially 01 knapsack problem. The proposed algorithm utilizes the variable distance move and repair operator of local search for solving knapsack problems. So far FA is generally applied to continuous optimization problems. In order to investigate the performance of FA on combinatorial optimization problem, an attempt is made in this paper. To demonstrate the efficiency of the proposed algorithm an extensive computational study is provided with standard bench mark problem instances and comparison with particle swarm optimization is also carried out.

Data-Driven Model Development Using Support Vector Machine for Railway Overhead Contact Wire Maintenance

Yuan Fuqing, Jinmei Lu
University of Tromsø - The Arctic University of Norway, Norway

The fault on Overhead Contact Wire (OCW) causes traffic disruptions in railway transportation. The inspection and maintenance on OCW is inconvenient as it locates highly above the ground. Condition monitoring system has been installed to monitor the status of the OCW automatically. Huge amount of data have been collected by these systems. However, a general problem of these systems is the analysis on these data is weak. The condition monitoring system has been devalued due to this. This paper aims to develop data driven Support Vector Machine (SVM) model to extract useful information from the huge amount of data. This data driven model evaluate the OCW status without requiring understanding the physical background. Maintenance points are suggested based on the output of the SVM model.

A Reliability Allocation Method Based on Bayesian Networks and Analytic Hierarchy Process

Zheng Ma, Yi Ren, Linlin Liu, Zili Wang
Beihang university, China

Reliability has been greater concerned in recent years and allocating proper reliability value to each component of a complex system as an optimization process to reduce cost and rise productivity is very important. This paper presents a reliability allocation method based on Bayesian networks (BNs). In this paper, the approach are presented in two main aspects: modelling aspect and analysis aspect. At modelling aspect, three main steps are descried. Build model by Reliability Block Diagram (RBD) and transform it into BNs with special weight nodes converted by the weight vector calculated in Analytic Hierarchy Process (AHP). At analysis aspect, the procedure of algorithm is based on the Bayesian approach to interfere and iterate until the value of the leaf node attains the reliability target. To demonstration of this method capability, an example from the literature was described, and the result shows that presented method is convincing and practicable.

Simple Approach for Value Stream Mapping for Business Process Analysis

Dorota Stadnicka[1], R.M. Chandima Ratnayake[2]
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[2]*University of Stavanger, Norway*

In order to achieve fast deliveries via short lead times, companies have to look for different manufacturing possibilities. Inherently, Value Stream Mapping (VSM) aids in identifying waste in manufacturing processes as well as related business processes focusing on minimizing possible time wastages. There is a trade-off between costs vs. shorter manufacturing or overall lead time. The main challenge is the elimination of waste to shorten overall manufacturing or business process (BP) time and related costs. The VSM has been conventionally utilized for manufacturing process analysis. It is typically observed that personnel in industrial organizations trying to optimize the overall price and lead time focus only on manufacturing related waste reduction. There are significant wastages generated from overall BP, which also directly or indirectly influence lead time to move beyond the anticipated threshold limits. Hence, this manuscript puts effort into developing a simple approach for VSM for analyzing and investigating drawbacks in the overall BP. A case study has been performed in collaboration with an aircraft-spare-parts manufacturing firm (AMF). A simple approach has been developed using the case study to investigate the inefficiencies present in the quotation preparation process (QPP). In addition to the approach, the resulting current state map (CSM), future state map (FSM), lead time (LT), processing time (Tp), process cycle efficiency (PCE), value added activity improvement (VAI) and non-value added activity improvement (NVAI) have all been analyzed.

Determining the Optimal Manufacturing Tolerance for a Single Machine with Deteriorating Processing Times

Laith Hadidi
King Fahd University of Petroleum and Minerals, Saudi Arabia

This paper examines a manufacturing system that deteriorates with machine age. The deterioration effect is shown as an increase on the rework percentage due to increased product quality rejection rates. Hence, the job processing time will be the planned time in addition to the rework time defined by total actual processing time of jobs in front of it in the sequence. The scheduling problem is intended to provide the optimal job sequence and manufacturing tolerance for quality characteristic. The objective of this work is to formulate a model that jointly determines the optimal sequence under deteriorating manufacturing times. Product rework economics will be considered explicitly in the model by using the quality loss function. More specifically, product outcome quality empirical relations will be considered in an explicit way in the sequence objective function.

Design of Fuel Valve Automatic Performance Test System Based on LabVIEW

Jinyong Yao, Chao Du
Beihang University, China

In order to detect the nonlinear characteristics (flow hysteresis) of aviation fuel valves and to improve the accuracy and efficiency of fuel valve performance test, a computer aided fuel valve automatic test system is designed. The test system mainly consists of industrial control computer, data acquisition card, signal conditioning circuit and test software developed on the LabVIEW virtual instrument platform. Independent adjustable constant current source module with high drive capacity is designed to output stable current for the coil of fuel valve, so as to realize closed-loop control. Besides, the method of grouping test is taken for actual testing and debugging, which help find out potential problems and improve the development process of the test system. The experiment results show that the system not only has an accurate and efficient test result, but also has the steady ability to detect the flow hysteresis of aviation fuel valve.

Dynamic Scheduling of Diffusion Furnace in Semiconductor Manufacturing with Real Time Events

M. Vimala Rani, Muthu Mathirajan
Indian Institute of Science, India

This study is motivated by a scheduling problem observed in the Diffusion Furnace (DF) of Semiconductor Manufacturing industry. Most of the earlier research in dynamic scheduling of DF (a Batch Processing Machine) considers only future arrival of jobs. This study focuses dynamic scheduling of DF considering future arrival of jobs along with job and resource related real time events to minimize the total weighted tardiness. In the literature there are some studies addressing the dynamic real-time scheduling for discrete machine environment. These studies are concentrating either on proposing new algorithms and/or fine tuning the existing algorithms due to the occurrence of real-time events while scheduling. In this study we hypothesis that no need to change any existing efficient dynamic scheduling algorithm(s) while real time events are occurring. This study proves the hypothesis proposed both empirically and statistically on nine efficient variants of ATC/BATC based greedy heuristic algorithms.

Camera Based Monitoring System for Deep Hole Measurement

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Camera based monitoring system has vital role in measuring deep hole parameters especially hole consists of long length and small diameter. The monitoring will help to eliminate errors in measuring deep hole parameters such as roundness, cylindricity etc. This paper proposed a camera based monitoring system for deep hole measurement. The camera is attached to the measurement head and rotates with the rotation of the measurement unit. It captures images, records videos and saves the measurement data in the storage. The monitoring system is aimed to enhance system's safety and reliability in measuring deep holes as well as to improve measurement accuracy.

Iterative Optimization of Tool Path Planning in Five-Axis Flank Milling by Sampling Techniques

Chi-Lung Kuo, Chih-Hsing Chu
National Tsing Hua University, Taiwan

Optimization of tool path planning using meta-heuristic algorithms provides a feasible approach to reducing geometrical machining errors in 5-axis flank machining of ruled surfaces. However, these algorithms experienced unsatisfactory quality of optimal solutions and lengthy search time in high-dimensional search space. To solve this problem, we propose an iterative optimization framework by integrating sampling techniques. First, significant factors are identified by Akaike Information Criterion (AIC) from sample points generated by various sampling techniques. Simplified solution space is constructed only with those significant factors. Electromagnetism-like Mechanism (EM) is then applied to search through the simplified solution space constructed using those significant factors. Final optimal solutions are obtained after several iterations of the previous three steps. The test results of representative surfaces validate the effectiveness of the proposed framework. The solutions are similar to those of previous work while the number of calculations was significantly reduced.

Decision-Making Method of Reconfigurable Manufacturing System's Reconfiguration Timing Based on Catastrophe Theory

Sihan Huang, Guoxin Wang, Yan Yan
Beijing Institute of Technology, China

For the problem how to make the decision of RMS's reconfiguration timing, a decision-making method based on information entropy and cusp catastrophe theory is proposed. The information entropy was used to characterize the complexity of RMS, including the factors of machine states, part states and so on. The RMS passive and positive information entropies were used as control variables of cusp catastrophe. According to the cusp catastrophe mutation determination condition, the RMS mutation point was decided, which was the RMS's reconfiguration time. A case study validated the effectiveness and practicability of the method proposed, which guided the launch of RMS reconfiguration in time and improve the response ability of RMS.

A Study of Shoulder Rest's Feet Height Variation on Upper Trapezius Muscle Activity in Violinists

Seng Fat Wong, Iok Peng Lei
University of Macau, Macau

Violin is an important role in music history. Comfort of holding violin also becomes a concern since this affects the ability and quality of performance. Literature review pointed out that upper trapezius is the related muscle when playing violin and proved that the performance of playing with a shoulder rest is greater than without it. However, the height of shoulder rest's two feet was only stated that all 'high' is better then all 'low', none of any researches study the different combination of height variation of the two feet. In this study, eight subjects were invited to participate the experiment and twelve shoulder rests were provided to test by applying human factors. Surface electromyography was used to collect the left and right upper trapezius muscle activities. The results showed there were significant differences and it indicated that the variation height of shoulder rest's feet could affect the upper trapezius.

An Innovative Modeling Method to Evaluate Human Factor E

ects on the Performance of Manufacturing Systems

Ahmad Sobhani, M. I. M. Wahab, W. Patrick Neumann
Ryerson University, Canada

Poor working conditions in a workplace influence employee health status that negatively reduce his/her performance level at work by developing occupational illnesses. Operations research performance optimization models rarely include employee health--related performance variations. In contrast, Human factors (ergonomics) studies have mostly focused on occupational health and safety aspects without accounting for operational elements of the system. This paper proposes an integrated consideration of human factors that can affect individual, and hence system performance. It presents an innovative approach to optimize the overall performance of a manufacturing system by quantifying occupational health consequences and including other operational features of the system. Practitioners can used this modeling approach to figure out how the performance of their systems will be enhanced by investing in safer working conditions.

Psychological Empowerment as a Strategy for Personnel Retention in the Oilfield Service Industry

Ngozi Onyemeh, Chan Wai Lee, Saadeesh Gunasekaran
University of Nottingham, Malaysia

The intellectual gap experienced by the oil and gas industry has created a hyper competitive environment forcing organizations to look for ways to retain their best talents beyond the traditional benefit offerings. This paper examines if components of psychological empowerment contribute to employee retention. To examine this, a survey was administered to 37 oilfield service personnel from different companies in Malaysia. The results indicate that psychological empowerment components of role ambiguity, span of control, sociopolitical support, access to information, access to resources, and participative unit climate encourage employee retention suggesting that retention programs which are cognitive in nature can yield intended result.

The Linkages Among Horizontal Strategy, Person-Environment Fit and Strategic Human Resource Management

Pratima Verma, R. R. K. Sharma
Indian Institute of Technology Kanpur, India

The main purpose of this paper is to identify relationship among horizontal strategy, person environment fit and strategic human resource management. This paper shows that how important to aligned corporate strategy to recruitment strategy or HR strategy for organization's long-term success and performance. Horizontal fit act as the sustainable competitive advantage of horizontal strategy for organization. More specifically, we present a conceptual framework, in which illustrates how person-environment fit, systematic fit and competitive potential HR strategy have impact on horizontal strategy through horizontal alignment.

The Prediction of Human Error Probability Based on Bayesian Networks in the Process of Task

Lin Mu, Boping Xiao, Weikang Xue, Zhen Yuan
Beihang University, China

With the increase of the reliability of equipment, more and more accidents are caused by human error so that human reliability analysis (HRA) becomes more and more attention. The paper constructs a prediction method of human error probability (HEP) by integrating performance shaping factors (PSFs) and Bayesian networks theory. Firstly, conditional probability table (CPT) of each node of Bayesian networks is determined through the simulation data, field operation and expert knowledge. Secondly, value of HEP is acquired by Junction Tree inference algorithm based on the given network structure and the known evidence, but PSF is a variable during task, so, the new HEP should be gotten by updating Bayesian networks based on new evidence, curve of HEP change over time can be drawn based on this. Finally, the paper takes pilots as example to elaborate application process and validity of this method.

Variation of Friction Coefficient of Floors Under Five Liquid Contamination Conditions for Prevention of Slip & Fall Injuries in Restaurants

Chia Yu Chang[1], Kai-Way Li[1], Ching-Chung Chen[2]
[1]*Chung Hua University, Taiwan*
[2]*Hsing Wu University, Taiwan*

Slip and fall is one of the main occupational health and safety problems. If the floor is contaminated with fluids, its slip resistance would be reduced. In the working environment and in our daily life, the floors in kitchens of restaurants are commonly contaminated by various liquids and are often slippery. This research examined the effects of five commonly encountered liquids in kitchens on the coefficient of friction on the floor. The Brungraber Mark II friction measurement device was used. The Brookfield DVI-PRIME viscometer was used to measure the viscosities of the tested liquids. The research results show footwear sample, liquid and their interactions all had significant effects on the coefficient of friction. The higher the viscosity of the liquid, the lower the coefficient of friction was. Treaded Neolite had higher coefficient of friction than flat Neolite under all liquid contaminated conditions.

Beyond the Obvious: A Framework for Exploiting the Impact of 3D Printing

Alan Pilkington[1], Thomas Frandsen[2], Märtha Rehnberg[2]
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[2]*Copenhagen Business School, Denmark*

This paper reports the development of an alternative framework to help firms asses the role of additive manufacturing within their technology management strategy. Despite much recent attention, there has been little work to identify and classify the ways in which additive manufacturing or 3D printing is used as a strategic weapon for competitive advantage. It is not just a way of reducing supply chain lead time as striking examples are emerging of firms employing more radical business opportunities and innovative design techniques available. We review the existing literature on the technology application, examine the classic nozzle case study to identify previously undocumented opportunities from the technology, and add a new case of a firm with a more holistic and strategic focus. We argue that a multidimensional model is required to classify the various opportunities available and current understanding needs to be widened for firms to take full advantage.

Investigation of Process Approach Implementation in Manufacturing Firms: A Methodology for Assessing Process Excellence Level

Dorota Stadnicka[1], R.M. Chandima Ratnayake[2], Katarzyna Antosz[2]
[1]*Rzeszow University of Technology, Poland*
[2]*University of Stavanger, Norway*

The process approach (PA) enables the improvement of manufacturing firms' (MFs') effectiveness and efficiency in achieving the defined aims via meeting clients' requirements and enhancing clients' satisfaction. The PA facilitates management and control of the interactions between different processes and interfaces between the functional hierarchies of a MF. It is vital to investigate the level of the utilization of PA for continuous improvement of the performance of an MF. This manuscript presents investigation results of the level of PA utilization in 46 MFs (out of 150 MFs which were invited to participate) based on tailor-made assessment criteria. It also presents a methodology for assessing the level of PA excellence.

Comparison of Artificial Neural Model and Response Surface Model During EDAG of Metal Matrix Composite

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Metal matrix composites (MMCs) faces machining challenges due to its superior mechanical properties. Hybrid machining processes (HMPs) are gaining popularity for machining of MMCs and newly developed advanced materials. Electrical discharge abrasive grinding (EDAG) is such an HMP combines unconventional electrical discharge machining and conventional grinding. In present research the experimental investigation of the copper-iron-graphite MMC has been presented for one of the important quality characteristics; average surface roughness (ASR) during EDAG. The artificial neural network (ANN) and regression modeling have been used to develop the predictive models for ASR. Both the models have been compared for their suitability to predict ASR.

The Influence of Annealing on Material Properties of Rotary-Friction Welded Steel-Parts

Sirichai Torsakul[1], Jakkarin Kongsib[1], Alexander Brezing[2]
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This research aims at examining the influence of annealing on the material properties of carbon steel that is welded in a rotary friction welding process. The material used in this research is AISI 1045 steel which has undergone an annealing process at different temperatures. The considered variables of the friction welding process include friction time, friction pressure, upsetting time and upsetting pressure which are systematically examined in 380 welding experiments. The welded specimens are analyzed regarding their tensile strength and the hardness of the weld seam. The quality of the weld seam and the microstructure is checked by means of microscopic imaging. The study shows that annealed and friction-welded AISI 1045 workpieces behave significantly different from workpieces made from the unannealed material. The tensile strength and hardness of the weld seam are higher than with the base material, so that such workpieces do not fracture at the weld seam as workpieces made from the un-annealed material do.

Fabrication of Graded Structures by Extrusion 3D Printing

John Giannatsis, Aggelos Vassilakos, Vassilis Canellidis, Vassilis Dedoussis
University of Piraeus, Greece

3D Printing allows the cost-effective and fast fabrication of parts with intricate/complex external and internal structure through the controlled addition of thin layers of material. This way, heterogeneous structures, i.e. structures with non-uniform density, can be constructed. In the present paper a method for the production of gradient structures with extrusion-type 3D Printing is discussed. The method involves three main steps: defining the geometry and material distribution of each layer in the form of a grayscale image, generating a set of points distributed according to the gray tone of the image and constructing a continuous path through the points for guiding material deposition by the 3D printer. In order to better present and test the method, two test cases of gradient structures are examined.

Design Process Using Lean Six Sigma to Reduce the Receiving   Discrepancy Report of ACE Logistics

J. Bersamin, R. Drio, A.L. Lacibal, C. Manalastas, Sheily Mendoza, G.D. Orallo, C.T. Tan
University of Perpetual Help System DALTA, Philippines

ACE Logistics, Inc. operates cross-dock procedures where products from suppliers are distributed directly to the customers or retail chains with marginal to no handling or storage time. The study will focus on the dispatch process. It aims to reduce the cases of Receiving Discrepancy Reports (RDR) that induce charges, to analyze the present system, to identify the causes of RDR and to develop a proposed system for the company. It was carried out using the DMAIC (Define-Measure-Analyze-Improve-Control) model of Lean Six Sigma. The DMAIC Model identified that the factors that causes RDR are facility, equipment, process and man. The proposed system, which includes the improvement of the facilities layout and the cross dock operation process, could be used in order to reduce the cases of RDR.

Finding the Robust Quickest Path for Call-Taxis in a City Road Network

Godwin Tennyson
Indian Institute of Management Tiruchirappalli, India

The increased number of vehicles on city roads has prompted a new type of transportation logistics problem of finding the quickest path for call-taxis through a city road network, where the travel times are stochastic. The stochastic nature of travel times are caused by various obstacles in a road network such as traffic signals and speed breakers. A Monte-Carlo simulation based approach is developed to identify unique quickest paths between two locations in a stochastic road network. A multi-criteria score is proposed to identify the time robust path among the unique paths. The proposed solution approach can be embedded in the navigation system of call-taxis to help them identify a path that has a higher likelihood of reaching a location on time.

Bi-Criterion Single Machine Scheduling Problem with a Past-Sequence-Dependent Setup Times and Learning Effect

Shih-Hsin Chen[1], V. Mani[2], Y. H. Chen[3]
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[3]*Asia University, Taiwan*

This paper considers the bi-criterion single machine scheduling problem of n jobs with a past-sequence-dependent setup times (PSD) and learning effect (LE) together. The two objectives considered are the total completion time (TC) and total absolute differences in completion times (TADC). When, we consider only the objective TC, we obtain an unique optimal sequence (solution). Also, when consider only the objective TADC, we obtain an unique optimal sequence (solution). When, we consider both TC and TADC together, we obtain a set of optimal sequences that performs well with respect to both the objectives TC and TADC. This set of optimal sequences is the minimum set of optimal sequences (MSOS). Our interest in this paper is to find this minimum set of optimal sequences (MSOS) that performs well with respect to both the objectives TC and TADC.

Placing a Liaison with Long Communication Lengths Between Two Members in an Organization Structure

Kiyoshi Sawada
University of Marketing and Distribution Sciences, Japan

This study proposes a model of placing a liaison which forms relations with long communication lengths to two members in the same level of a pyramid organization structure such that the communication of information between every member in the organization becomes the most efficient. When an added node of liaison gets adjacent to two nodes with the same depth N in a complete K-ary tree of height H where the lengths of edges between the liaison and the other members are L $(1 < L < 2)$ while those of edges between members except the liaison are 1, the total shortening distance which is the sum of shortening lengths of shortest paths between every pair of all nodes in the complete K-ary tree is formulated to obtain an optimal pair of two members to which the liaison forms relations.

A Robust Optimization Approach to Postdisaster Relief Logistics Planning Under Uncertainties

Yajie Liu, Ping Jiang
National University of Defense Technology, China

Considering the uncertainties on demand and transportation time, this paper proposes a stochastic model with bi-objective for postdisaster relief logistics, in order to guide the strategic planning with respect to the mobilization levels of relief supplies, the initial deployment of vehicles and the transportation plans within the disaster region. The robust optimization approach is introduced to cope with uncertainties and the robust counterpart of the proposed stochastic model is deduced. An approximate lexicographic approach is used to convert the bi-objective robust model into two sequential single objective robust models. Numerical experiments show that the model can help post-disaster managers to determine the initial deployment of emergency resources, and the numerical results can express the tradeoff between optimization and robustness.

Search-Enhanced Job Dispatching in a Dynamic Permutation Flowshop

Ahmed W. El-Bouri
Sultan Qaboos University, Oman

A dynamic flowshop that continuously receives jobs at random points in time is considered, with the objective of scheduling the jobs in an order that minimizes the mean flowtime. A tabu search is proposed for deciding which job to dispatch next to the flowshop, and the approach is then compared by means of a computational analysis with a number of other competing dispatching rules. The results demonstrate that the search-enhanced dispatching method achieves reductions of between 13% and 17% in the mean flowtimes in comparison to the other dispatching rules. However, the proposed method is not as competitive in comparison to a more complex cooperative dispatching approach when shop congestion levels are medium to low.

New Benchmark Results for the Stochastic Resource-Constrained Project Scheduling Problem

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In this article we study the stochastic resource constrained project scheduling problem or SRCPSP, where project activities have stochastic durations. A solution is a scheduling policy, and we propose a new class of policies that is a super set of most of the existing classes that are available in the literature. A policy in this new class makes a number of a-priori decisions in a pre-processing phase while the remaining scheduling decisions are made on-line. A two-phase local-search algorithm is proposed to find high-quality policies within the class. Our computational results indicate that the proposed procedure outperforms all existing algorithms for large instances.

Selection of Base Fluid for Drilling Mud Using Analytic Hierarchy Process

Gowri Rajagopal, Malliga Poosandaram
Anna University, India

Drilling fluid or fluid plays a major role during the drilling operation in the upstream petroleum sector. Designing of these fluids is a difficult process as it involves multiple parameters that need to be in appropriate proportion in order to achieve the requisite fluid property suitable to drill through the formation. Selection of the base fluid must be done in compliance with various factors like formation type, environment, cost, efficient operation, etc. Based on literature, discussions with industry experts, and survey responses a drilling base fluid which is efficient in both operative aspects as well as environmental aspects is identified. Using Analytic Hierarchy Process (AHP) a suitable base fluid was selected among the various alternatives.

Session	Operations Research 2
Date	7/12/2015
Time	14:00 - 15:30
Room	MR329
Chairs	Philipp Baumann, Mohamed Haouari

Efficient Deployment of Mobile Detectors for Security Applications

Philipp Baumann[1], Reynold J. Cooper[2], Dorit S. Hochbaum[1], Nidhi Patel[2], Kunal Shalia[1]
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We present a real-world problem that arises in security threat detection applications. The problem consists of deploying mobile detectors on moving units that follow predefined routes. Examples of such units are buses, coaches, and trolleys. Due to a limited budget not all available units can be equipped with a detector. The goal is to equip a subset of units such that the utility of the resulting coverage is maximized. Existing methods for detector deployment are designed to place detectors in fixed locations and are therefore not applicable to the problem considered here. We formulate the planning problem as a binary linear program and present a coverage heuristic for generating effective deployments in short CPU time. The heuristic has theoretical performance guarantees for important special cases of the problem. The effectiveness of the coverage heuristic is demonstrated in a computational analysis based on 28 instances that we derived from real-world data.

A PSO Approach for Robust Aircraft Routing

Mohamed Ben Ahmed[1], Farah Zeghal Mansour[2], Mohamed Haouari[1]
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To mitigate the impact of unpredictable disruptions, airlines are seeking to proactively design schedules that incorporate some robustness features. In this paper, we propose a novel simulation-optimization approach using a particle swarm optimization algorithm for solving the robust aircraft routing and flight retiming problem. The approach requires inserting buffer times between departure times of flights to improve the robustness of both aircraft and passengers connections. The proposed approach is based on discrete-event simulation for the evaluation of the solutions performance and a Particle Swarm Optimization (PSO) routine for guiding the search towards enhanced solutions. The results of computational experiments that were carried out on a real data are presented.

Extension of the Dominance Properties for the Unrestricted Block Relocation Problem

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The block (container) relocation problem is an optimization problem that typically arises in container terminals. Its objective is to minimize the number of relocation operations necessary for retrieving all blocks (containers) stacked in tiers according to a given order. In our previous study, we considered the unrestricted version of the problem where no restriction is imposed on relocatable blocks, and proposed two dominance properties for it. However, they considered only two successive operations. The purpose of this study is to extend them for any two operations. They enable us to improve the efficiency of the branch-and-bound algorithm for the problem, which will be verified by numerical experiment.

A Simulated Annealing Algorithm to the Stochastic Network Interdiction Problem

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This paper proposes a solution algorithm for solving the stochastic network interdiction problem (SNIP). The problem is formulated as a two-stage stochastic integer program with an objective to minimize the expected maximum flow through the network, given that the success of interdicting an arc on the work is a Bernoulli random variable. The first-stage solution is obtained by using simulated annealing heuristic algorithm. In the second-stage problem, each scenario is a maximum network flow problem which is solved using the Ford-Fulkerson algorithm. The results show that our solution values of test instances are close to optimal. This is verified with a previous study in the literature that solved the same exact test instances and provided lower and upper bounds to their solutions. However, our average solution time is significantly lower.

Minimization of the Makespan a Project in the Critical Chain Project Management Framework Using a Max-Plus Linear Representation

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The minimization of the makespan of a project is targeted under the critical chain project management (CCPM) framework. Although the conventional CCPM discipline does not pay attention to the optimality of the solution, the execution sequence of tasks would highly affect the makespan. We hence construct an optimization problem of minimizing the makespan, and develop a solving method for this. In calculating the objective function value, a discrete algebraic system referred to as max-plus algebra plays a key role. The developed algorithm bases on branch-and-cut and branch-and-bound methodologies, by which an exact optimal solution can be obtained.

Emergency Response Model of Stock-Prepositioning with Transportation Constraints

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This paper proposes a stock pre-positioning model that integrates the decisions of the maximum proportion of relief demand covered in distribution centers and the maximum amount of relief supplies delivered to a single disaster area within a certain period of time. This model considers multi-items, multi-vehicles and multiperiods. First, the service area for each distribution center is assigned. Afterward, in stage I, we determine the minimum value of the lower bound of proportion of unsatisfied relief demand by using the assigned service area of each distribution center as an input. Next, in stage II, the output of stage I is used as an input to determine the maximum amount of critical relief supplies to be stocked in distribution centers. We apply this model to Indonesia with 34 disaster areas and 16 temporary distribution centers. Sensitivity analysis is conducted by modifying the number of available vehicles and the total planning period in order to improve the results of proportions of relief demand satisfied. This model is intended to support the government in planning for emergency preparedness.

A Deterministic IP Model for Optimizing Bus Scheduling in a Private Transportation System

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In this paper, we propose a deterministic optimization model for selecting and scheduling a fleet of buses in a private transportation system where buses are to be assigned to serve employees and their families on different trips along different routes from the main campus and residential compound. The paper describes the development of an integer programming formulation as a tool to help in the decision making process of improving this private transportation system. The decision problem is to determine the number and size of buses assigned to particular trips in a particular interval so as to optimize a criterion function, which includes such components as the fixed cost of renting buses that varies depending on the size of the bus. A case example is presented for illustrating the applicability and suitability of the proposed approach.

A Goal Programming Model with Satisfaction Function Applied to Sustainability Related Goals of the United Arab Emirates

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Goal programming methodology provides a suitable framework for studying multi-criteria problems involving conflicting objectives. Most real world problems involving sustainable development strive to achieve futuristic goals. Goal programming models with satisfaction function offer an attractive choice to express decision makers' preferences over the model objectives. In this paper, we propose a goal programming model with satisfaction function that integrates optimal resource allocation to simultaneously satisfy prospective goals related to GDP growth, electricity consumption, greenhouse gas (GHG) emissions and number of employees. The model offers insights for developing strategic plan and channelize investment allocations towards achieving goals for sustainable development. We demonstrate the validity and applicability of the model through a numerical example applied to key economic sectors of the United Arab Emirates (UAE).

An Evaluation Carbon Footprint in Fly Ash Based Geopolymer Cement and Ordinary Portland Cement Manufacture

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Global warming is one of the main environmental worldwide issues arising from industrialization and urbanization wherever countries and cities. An ordinary Portland cement production is accelerating this issue. This paper compared the CO_2 emission of producing one tonne of fly ash based geopolymer cement and ordinary Portland cement in same manner within defined boundaries by using global warming potential and carbon dioxide emission equivalent methods. The outcome is 36.514% and 63.486% with respect to carbon footprint.

Monarch Migration Algorithm for Optimization Problems

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In this work, we intend to formulate a new metaheuristic algorithm, called Monarch Migration Algorithm (MMA), for solving optimization problems. This algorithm is based on the migratory behavior of the monarch butterflies. We validate the proposed algorithm against various unimodal and multi-modal test functions. The performance of the proposed algorithm is also compared with the performance of standard swarm intelligence based metaheuristic algorithms. Numerical studies and results suggest that the proposed algorithm is highly efficient for different types of optimization problems. Possible topics for further research are also discussed.

Solving the Single Machine Total Weighted Tardiness Problem Using Bat-Inspired Algorithm

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This paper aims to present an application of a recently proposed metaheuristic approach, namely bat algorithm (BA), for solving the single machine with total weighted tardiness (SMTWT) scheduling problem. In this paper, a guided population and two-swap local search are introduced to integrate with the BA. Four variants of BA methodology, including classical BA, BA with two-swap, BA with guided population, and BA with guided population and two-swap, have been developed. All BA variants are executed on the selected benchmark instances for the SMTWT problem taken from OR-library and compared search performances on deviation of solution obtained from best-known solution and computation time. The results show that two proposed BAs with a guided population scheme achieve a good performance. The BA with guided population and two-swap techniques outperforms among four proposed designs on solution quality, and it can achieve a trade-off between solution quality and execution time.

Adjusted Clustering Clarke-Wright Saving Algorithm for Two Depots-N Vehicles

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Petra Christian University, Indonesia

In this paper we modeled the distribution of a single type of products, which are distributed from two depots and use N-vehicles. This problem can be modeled using Capacitated Vehicle Routing Problems (CVRP), and the common algorithm to solve that model is Clarke and Wright Saving Algorithm (CWSA). The needed computational time for finding the nearly global optimum of CWSA grows expo-nentially with the numbers of the existed routes. Therefore, in this paper, we proposed to combine the clustering algorithm with CWSA. Additionally, we consider the largest item in the cluster, which has to be transported, as the starting point to find the optimum solution.

Evaluation and Selection of Periodic Inventory Review Policy for Irregular Demand: A Case Study

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Periodic inventory review systems are generally preferred by organizations but the selection of right periodic inventory control policy is a challenge especially when demand is irregular. In this research, we classify irregular demand into erratic, slow moving and lumpy for a real industry case, and further develop three periodic review policies for performance evaluation. The simulation results show periodic review policy (r, Q) maintains the lowest holding inventory for erratic and slow moving demand, meanwhile, it can achieve similar service level compared to (s, S) policy. Periodic review policy (T, R) is superior for lumpy demand which can ensure high service level. The impact of coefficient of variance, a standardized measure of the dispersion of demand, on inventory policy performance is evaluated in the first time in literature. The results suggest inventory policies are rather insensitive to demand coefficient of variation under the modeling condition.

Productivity Improvement in Logistical Work Systems of the Genuine Parts Supply Chain

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Within the entire value stream of spare part supply, packing is one of the main issues in the distribution system and its productivity is mainly affected by a particularly high proportion of manual work. Considering the total value stream of supplying original spare parts, picking and packaging are two of the most important activities in the distribution system and they are mainly performed by intensive manual tasks. As practice shows, the methods Value Stream Design and Methods-Time Measurement (MTM) have proven to be suitable for improvement work and consequently for increasing productivity especially in work systems with manual work. This paper shows how the process building block system 'MTM logistics data' contributes to planning and specifying parameters of target-conditions of value streams. It also presents a methodical approach to support practical improvement work in logistical value streams and within their work systems.

A Pricing Strategy to Align Supply Chain Interests for Product Recall

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Traceability systems are regarded as an effective way to address product recalls. It cannot work effectively without the participation of all the chain members. However, the incentives in the supply chain are not naturally aligned, and may need interest-alignment mechanism to motivate the chain members to participate. This paper thus proposes a pricing strategy to avoid free-rider problems by correcting the liability misallocation, therefore aligning the supply chain interests to improve traceability. The trade-offs between the associated benefits and costs of improving traceability are investigated, in order to design a cost-effective traceability system. Moreover, how to better manage product recall by incorporating new technology, such as RFID, and the conditions that are conducive to its adoption are investigated.

SCM Logistics Scorecard: A Simplified Benchmarking Tool for Supply Chain Operational Performance

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This research intends to introduce SCM Logistics Scorecard (LSC) as a simplified benchmarking tool based on self-evaluations of SCM operational performances. By utilizing LSC, SCM operational performances in different East Asian countries, namely, Japan, China and South Korea were investigated. The scores of assessment items in LSC were compared among countries. Subsequently, a factor analysis was conducted in order to identify significant influential factors that represent the operational performance of SCM in each country. Similar structure has been extracted in these three East Asian countries and from Japanese data, it has been verified that IT is necessary, but not sufficient to lead to enhanced corporate financial performances such as ROA, cash flow and inventory turnover.

Supply Chain Management in Service Industry: A Process Capabilities Perspective

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This paper develops and tests the measurement scales for service supply chain management (SSCM) process capability constructs. An extensive literature review and interviews were conducted to define the constructs and initial measurement items. The measurement items were refined by using the Q-sort method. Confirmatory factor analyses of a large-scale survey confirmed the unidimensionality, reliability, and validity of the multidimensional construct of SSCM process capability. The findings show that SSCM process capability consists of seven-dimensional constructs, each represented by a unidimensional multi-item scale Practitioners may use the scales to benchmark and develop their capabilities in managing SSCM processes beyond the typical internal service supply chain capabilities. The development of measurement scales elevates the service operations field, which previously relies on largely conceptual frameworks and descriptive accounts of SSCM processes. The measurement scales of SSCM process capability can be also used by future empirical studies to advance theory in service supply chains.

Solving the One-Shot Decision Theory Based Newsvendor Models

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The one-shot decision theory has been utilized to solve newsvendor models for innovative products. In fact, the one-shot decision theory based newsvendor models are a special kind of bilevel programming problems. The existing approaches may not be applicable for solving these models since they include nonconvex nonsmooth lower level optimization problems. In this paper, we translate these models into general optimization models with considering the characteristics of the optimal solutions, which effectively handle the difficulties of the original newsvendor models. The theoretical results are given and a numerical example is used to show the effectiveness of the proposed methods.

SD Modelling of Healthcare SC in Rural Parts of Uttarakhand, India

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This paper presents the system dynamic modelling and simulation of folic acid tabs supply chain in rural areas in district Haridwar, Uttarakhand, India. During the investigation and data collection, an enormous shortage of folic acid tabs was observed at various stages leaving a large population unserved. The stock out occurs due to uncertain lead time and demand. Therefore the model is developed with a safety stock at each stage on Stella® platform. The simulation has been run for a time span of twelve months. Further sensitivity analysis is performed showing the effects of lead time on the stock at women's hospital, schools and community health centers. The results show the elimination of stock out of medicine at all the downstream stages maintaining a safety stock. The current work may support the strategists to take essential steps to improve the sustainability of the healthcare supply chain in parts rural of the state by diminishing the shortage of medicines.

A Mixed-Integer Programming Model for the Production-Inventory-Distribution Routing Problem

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In this paper, a mixed-integer programming model is proposed to solve the Production-Inventory-Distribution-Routing Problem (PIDRP), with the objective of minimizing the total cost while satisfying the required levels of demand and service. A generic problem description and mathematical model formulation are proposed to address the PIDRP. The novelty of the model is that it deals with multiple products, allows split deliveries, adopts a heterogeneous fleet of vehicles, and puts a limit on the duration of the route performed by each vehicle. The proposed model is successfully validated and tested using small-sized instances from literature.

Information Security Evaluation of System based on Bayesian Network

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This paper proposed an information security Bayesian network (IBN) model to evaluate the system information security. First, an information security hierarchy model is put forward with the analytical hierarchy process based on the characteristics of equipment development enterprises information systems and information security evaluation criteria. Then, according to the definition of Bayesian network, the IBN is built by transforming the information security hierarchy model into Bayesian network with structure and probability distributions. Finally, a case study is implemented to demonstrate the proposed evaluation method. The results show that the IBN model provides a convenient framework to evaluate the system information security.

A Risk Management Methodology for R&D Project Risk Based on AHP and Fuzzy Comprehensive Evaluation Method

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R&D Project risks are not always independent, yet currently dependencies between risks have not been managed by risk management practices clearly. If risks with multiple fronts can be identified and analyzed explicitly by a scientific risk management method, it will be developed for better risk management strategies and more effective risk planning decisions. A management methodology, used with factor analysis and AHP is proposed to set up project risk evaluation index system. Through fuzzy comprehensive evaluation method in GD, it could be confirmed that risk factors do exist in R&D projects in full life time and can be identified, evaluated and managed systematically. To deal with risk issues, communications between knowledge management system and risk management team should be built in the entire risk management in R&D in full life time.

An Investigation to the Environmental Impacts of a Limestone Mine in Neka, Iran

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The extractive nature of mining operations creates a variety of impacts on the environment before, during and after mining operations. In this study, the main environmental impacts of a limestone mine in Neka, Iran were investigated. The investigated environmental impacts include dust distribution, ground vibration from drilling and blasting and soil erosion. Management methods were put forward based on the results.

An Analysis of Floor Roughness & Slip Resistance of Floors

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Slip and fall are the main cause of occupational injuries or fatalities at workplace. Falls have been one of the top three occupational incidences which reached a peak in 2013 with an incidence percentage of 17% in Taiwan. Most falls were attributed to unsafe environment where the floors were contaminated by the water and other liquids. This research was focused on the relationship between floor slip resistance and floor roughness. The coefficient of friction (COF) of 13 floors under four floor contaminated conditions were measured using two footwear pads. An English XL friction measurement device was adopted. The results showed that floors roughness, footwear sample, and floor surface condition are all significant factors affecting the COF. All the floors with Ra more than 25 μm had COF values higher than 0.5 when measured using the flat footwear pad.

Critical Antecedents for Construction Organizational Learning Concerning Safety Knowledge from Success and Accidents

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To address the challenges of high accident rate in construction industry, construction companies tend to capture safety knowledge by learning from success and accidents to improve safety performance. Thus, this paper aims to extract critical antecedents affecting organizational learning regarding safety knowledge (OLSK), from both success companies and accidents, and to recommend strategies for improving this learning in construction companies. Multiple case studies were conducted with focus group, semi-structured interviews and questionnaires as primary data collection instruments. By adopting Nvivo and PLS, analytical-contrast results indicate that the critical antecedents influencing OLSK includes (1) external factors covering market leadership, similarity, magnitude of accidents loss, information quality; (2)internal factors incorporating leadership, strategy, supportive culture, incentives and motivation, project requirement. Additionally, internal factors present more effect on learning from success than accidents while external ones have opposite effect. The research contributes to literatures of organizational learning by showing critical antecedents for the construction context.

Effects of Footwear Sample Area on the Friction Coefficient on the Floor

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Slips & falls are common. The coefficient of friction (COF) at footwear and floor interface is one of the major term to determine the risk of slip & fall. Past research has been focused on surface contamination, footwear tread, and floor roughness, the footwear sample area has rarely been discussed. This research was designed to investigate the effects of footwear sample area on the COF on the floor. Five footwear sample areas were tested on two floors and three floor surfaces conditions. A Brungrber Mark II slipmeter was used. The results showed that footwear sample area, floor, and surface condition were all significant ($p<0.05$) factors affects the COF. On liquid contaminated conditions, the larger the footwear sample was, the lower the COF of the floor was. This was consistent with the squeeze film equation by Moore [11].

Million Solar Urja Lamp Programme: A Supply Chain Experience

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Many technological solutions for rural areas, even after successful demonstrations, have not been able to reach the intended beneficiaries at the scale and speed required to address their underlying problem. The Million Soul Urja Lamp Program (MSP) is an effort to take solar lamps to rural India to address their primary energy needs, through localization and skill development. This paper outlines the supply chain and operational challenges in achieving scale and speed, and summarizes the performance of this project from an operations perspective.

Facility Location Problem with Data Uncertainty for Quality Rice Development

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Rice is one of the most important agriculture products for Thailand. Thailand has exported rice since Ayutthaya period. Under a highly competitive environment among rice exporters, Thailand's low grade rice is not competitive in the market. Thailand 'exporters change their strategy by entering into niche market. To gain competitive advantage, quality and safety of rice must be maintained either for domestic market or international market. The quality refining rice facility is an important factor to improve quality of rice and ensure consumer's safety. The location of quality refining rice facility determines the overall distribution cost. The paper first formulates the problem as p-median and then presents a robust counterpart optimization model to address data uncertainty of rice production in farming area in Thailand. The proposed model is tested against rice production data in Thailand from 2008 to 2012. The results show that Bangkok, Chonburi, Nakorn Ratchasima, and Nakorn Sawan are selected to be quality refining rice facility sites.

Novel Approach to Optimize Milk-Run Delivery: A Case Study

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This article proposes a new approach to optimize a milk-run delivery in supply chain (SC) which was introduced by Zhou and Kelin (2011). These authors particularly formulated the mathematical model of SC total cost at operational level for milk-run delivery and used Ant Colony Optimization (ACO) to find out the results in one specific case study. Yet, the solution found by this Meta-Heuristics did not obtain optimal values. Hence, to improve the solution, the paper presents one new method namely Hybrid Ant Colony Optimization and Tabu Search (HAT). To qualify new method, Tabu Search (TS) is taken into account in testing stage. With the same data in the case study and random data, the new method outperforms the original and TS regarding SC total cost and milk-run distance.

A Study of Reverse Logistics Practices: A Case Study of the Computer Parts Industry in Thailand

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The return of end of life products and waste is becoming an important logistics activity due to increasing environmental awareness and government legislation. The main aim of this research is to investigate current process and activities of reverse logistics practices in the computer parts industry of Thailand. Five groups of manufacturers are case studies of this research in which in-depth interviews and unstructured questionnaires are used to discover the current situation, process and activities under reverse logistics practices. The results of the research, interesting situations, problems and directions of the reverse logistics of the computer parts industry were found. The results presented in this research will help researchers and practitioners understand more about reverse logistics practices in the computer parts industry of Thailand and could be a guideline for further research in the computer parts industry and other related industries.

The Complexity of Electronic Data Interchange (EDI) Compliance for Automotive Supply Chain

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The Electronic Data Interchange (EDI) is a fast and efficient way to transfer business documents. It allows optimization of logistic information flows and their synchronization with the physical flows. This study aims to explore how the automotive industry in Morocco is using the EDI technology to optimize flows and ensure in-time production (JIT) and how to avoid waste during the manufacturing process (Lean). It will compare the EDI practices in Morocco with international standards in Europe and Asia and deduct the difficulties and the implications for Moroccan SMEs.

Allocation and Proportion Decision in Multi-Tier Supply Network

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Supply network of any manufacturing product is generally multi-tier in nature. Suppliers to manufacturer are called Tier-I suppliers, and suppliers to Tier-I supplier are referred as Tier-II suppliers. In general, decisions on order quantity allocation at each level of sourcing are independent. Thus, overall cost performance of supply network may be sub-optimal in presence of dependency. In this paper, considering dependency, a generalized solution approach is proposed for a single product sourcing. The approach consists of two steps i.e. supplier selection and order quantity allocation at different stages. Mixed Integer Nonlinear Programming is used to determine solution assuming multi-echelon inventory policy. Specific cost advantage metric considering independent decentralized and a multi-tier centralized decision policy is compared and contrasted. A full factorial simulation experiment is used to identify key decision variables and associated interactions.

Process Selection Based on Overall Process Yield

Y. J. Lan, Chen-Ju Lin
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Comparing the capability of processes is an essential task in the manufacturing industry. Selecting the process with a higher yield is critical to maintaining production quality and cost. With the miniaturization of physical dimensions and lower power consumptions, microelectromechanical systems (MEMS) are widely applied in various domains. This research compares two processes that produce the pre-amplifier of MEMS sensors. Three quality characteristics were investigated: pre-amplifier gain, absolute reference voltage, and module quiescent current. To integrate process capability in multiple dimensions, a measurement for evaluating the overall performance is required. This research applies the overall process yield index to identify the process with a higher overall yield when simultaneously monitoring the three features.

Hurdle Model with Random Effects for the Study of Copper Hillocks Growth in Integrated Circuits Manufacturing

Guilin Li, Royston Tan, Szu Hui Ng, Daniel Chua
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During manufacturing process of integrated circuits (ICs), copper hillocks grow vertically from the metal lines and cause inter layer metallic shorts and reliability issues. Uncovering the impact of design factors on the formation of copper hillocks is of vital importance for reducing shorts and improving the ICs design. An experiment was conducted to collect the wafer defective counts (shorts) data for different design settings. Our preliminary analysis identified two characteristics of the observed defective counts: zero-inflation and multi-level clustering/variability (layer-to-layer, wafer-to-wafer, lot-to-lot). In this work, a hurdle model with random effect that handles both these complex characteristics together is adopted and provides us with a better understanding of how to monitor and reduce the effects of copper hillocks by recommending design rules.

The Classification Methodology of Chip Quality Using Canonical Correlation Analysis-Based Variable Selection on Chip Level Data

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The semiconductor manufacturing industry produce lots of information about performance of chips. Among them, process control monitoring (PCM) data that are measured at test element group before probe test are multiple-dimensional information. PCM data are including the device characteristics such as a resistance, capacitance, current, and so on. Fail bit count (FBC) that is the number of defective cells failed by function items of probe test is also multi-dimensional information and gives a direct impact on the yield loss at the probe test step. In this study, we proposed classification methodology using a canonical correlation analysis as variable selection method on chip level data. Through this proposed method, we were able to extract important 22 variables from 77 PCM variables by using the correlation between the multiple FBC variables and PCM variables. As a result, the accuracy of quality classification for a chip is dramatically improved on the probe test.

A Combined Synthetic and Generalized Variance Control Chart for Bivariate Case

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This study proposes a combined scheme, denoted as the combined syn-$|S|$ control chart, which comprises a synthetic $|S|$ sub-chart and a standard $|S|$ subchart. This proposed control chart can be used to detect shifts in the covariance matrix of bivariate process (i.e. multivariate process with quality characteristics $p = 2$). It is assumed that the underlying process data follow a bivariate normal distribution. The design, performance and implementation of the combined syn-$|S|$ control chart are provided. From the results of the performance comparison, it can be shown that the combined syn-$|S|$ control chart performs better than the standard $|S|$ control chart, the adaptive $|S|$ control chart and the synthetic $|S|$ control chart for monitoring process variability in terms of the average run length.

Optimization Design of X^bar&EWMA Control Chart for Minimizing Mean Number of Defective Units per Out-of-Control Case

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This article develops an algorithm for the optimization design of the combined Shewhart Xbar chart and Exponentially Weighted Moving Average (EWMA) chart for minimizing the mean number of defective units (denoted as MD) produced per out-of-control case. The resultant chart is therefore named as the optimal MD Xbar&EWMA chart. The design algorithm not only optimizes the sample size, sampling interval and control limits of the Xbar chart and EWMA chart, but also optimizes the allocation of detection power between the two charts' elements based on random process shift. The probability distribution of the random process shifts (e.g. mean shift) is taken into account and is modeled by a Rayleigh distribution. Unlike the economic control chart designs, the design of the MD Xbar&EWMA chart only requires limited number of specifications that can be easily determined. A comparative study shows that the optimal MD Xbar&EWMA chart is significantly superior to its main competitor, a traditional MD Xbar&EWMA chart.

Purple Rice Dessert Product Development by Quality Function Deployment Technique and Mood Consumption Concept

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Purple rice has been used for generations among northern Thai people as part of ancient wisdom in agricultural nutrition and primitive medical treatment. The objective of this research is to develop purple rice dessert products to satisfy customer requirements and to generally add value to the purple rice by Quality Function Deployment (QFD) technique and Mood Consumption concept. Questionnaires and in-depth interviews were conducted to collect customers' needs and to classify the customer into each mood consumption group. Then, QFD was implemented to transform customer requirements into technical specifications for each categorized consumer. The results showed that of all the product types, the important ratings were for price, package characteristics, and product's texture. In addition, Analytic Hierarchy Process (AHP) was implemented to identify proper packaging corresponding to each mood consumption group. Finally, the result of the product testing showed that the prototypes can satisfy the needs of consumers at a good level.

A Collaborative Tagging System Design Framework for Supporting Affective Design

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Affective or kansei design engineering is a design approach that can help designers to produce emotionally pleasing products. One of the research challenge of this approach lies in understanding customers' affective needs and how to associate such needs with product design features. Previously, we have proposed a collaborative tagging methodology towards understanding associations between affective needs and product design features through analyzing product reviews. In this paper, we proposed a framework for collaborative tagging system design as an extension of our previous work and actual web-based implementation of our approach. We showcase the design of our web-based system which includes client interface layer, web application layer and back-end application processing layer with detailed elaboration on essential system components and modules. Some potential benefits of implementing such a collaborative platform are also briefly discussed.

Towards Future Information Management for High Value Component Manufacturers

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Manufacturers across the globe are transforming from product suppliers to service providers. They face numerous challenges, in particular the staggering amount of heterogeneous information generated out of a growing number of functional or operational silos, which often lead to redundancies and conflicts that compromise system efficiency. In this paper, we look into the problems and opportunities of high value component manufacturers on their change initiative towards higher level service provisioning. The need for lean and flexible information management is discussed to accommodate future technology inclusions. A preliminary approach of cost and benefit analysis which incorporate two novel leanness measurements, is proposed to assist manufacturers in this industry to get the best out of the investment. More focused study shall be reported along the journey of joint exploration.

An Active Learning Variable-Fidelity Metamodeling Approach for Engineering Design

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Computational models with variable fidelity have been widely used in engineering design. To make a trade-off between high accuracy and low expense, variable fidelity (VF) metamodeling approaches that aim to integrate information from both low fidelity (LF) and high-fidelity (HF) models have gained increasing popularity. In this paper an active learning variable-fidelity (VF) metamodeling approach (ALVFM) based on a Kriging scaling function is proposed, in which the one-shot VF metamodeling process is transformed into an iterative process to utilize the already-acquired information of the difference characteristics between the high-fidelity (HF) models and low-fidelity (LF) models. An analytic nonlinear numerical case and a long cylinder pressure vessel optimization design problem verify the applicability of the proposed VF metamodeling approach.

Structuring the Engineering Change Management Process Around Change Carriers

Peter Sjögren, Bjorn Fagerström
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Prior research in the field of offshore platform project execution has mainly focused on early project phases and planning, as a means to increase project reliability for offshore installations. Later phases, however, as fabrication, transport and installation have not been given the same attention. Projects of this kind frequently suffer both large and small deviations and as projects progress deviations accumulate. Deviations then have to be resolved in a timely manner not to impair quality and scheduling of an overall project. Empirical data was gathered from two offshore platform projects in the form of archival data, observations and interviews. The findings revealed that engineering change, as a tool, should preferably be used sparingly in early phases and as necessary in later phases. This research also suggests that engineering change can be organized around change carriers. In this way, it is predicted that the processes of change can become more stable and predictable.

Reconstruction of Smooth Contours from Low Resolution Digital Elevation Model Data

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Using low resolution digital elevation model (DEM) data, reconstruction of cartographic contours is focused on. With a small number of control points, we aim to draw a smooth curve as well as to compute the area and perimeter of a closed contour accurately. The input data forms an oriented contour, each control point of which consists of three values: x, y, and tangent angle. An interpolation method based on arc spline is developed. The method can reproduce G1 continuous curves,in which the exact area and perimeter can be calculated. In a numerical experiment for analytically defined curves, accurate computation of the area and perimeter was achieved with a smaller number of control points. In another experiment using a DEM data, the reconstructed contours were smoother than those by a conventional method.

Cloud-Based Data Exchange and Messaging Platform Implementation for Virtual Factory Environment

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University of Vaasa, Finland

Recent advances in Information and Communication Technologies (ICTs) have allowed manufacturing enterprises to improve business collaboration both within an enterprise and among enterprises, for achieving mutual benefits. The companies can achieve such business benefits through a formation of new business domain known as Virtual Factory (VF), which is particularly beneficial and applicable within Small and Medium-sized Enterprises (SMEs). In this research paper, we introduce a Cloud-based data exchange and messaging platform to facilitate the integration and interoperability within VF partners. This information exchange is considered as a critical factor to face challenges of VF domain. Within this data exchange and message platform three essential components are included such as: message routing, message transformation and gateways. To realize a high degree of performance, reliability, scalability and stability, this platform is designed as cloud-based. In this paper, we also discussed technologies, challenges, trends and issues that must be addressed to implement this Cloud-based Data Exchange and Messaging Platform.

Environmental Performance Evaluation (EPE) for Small Medium Industries

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Due to the increasing demand for green manufacturing and environmentally friendly products, environmental performance evaluation (EPE) is now a necessity for manufacturing companies. Environmental performance evaluation is an internal process of any manufacturing organisation through which they can identify their environmental indicators (such as energy consumption, solid waste and reprocessed materials) with highest negative impact on the environment. This paper presents the model of environmental performance evaluation which can be applied by small medium industries and also it can accommodate different environmental indicators as input, produces the environmental performance in linguistic terms (e.g. moderate, satistisfied, and optimum) as output. This helps the company continuously monitor their environmental impacts via controlling their environmental indicators.

Fatigue Life Analysis and Life Expectancy Design Strategy for Flexible Hinge Under Random Variable Amplitude Loading

Jianjun Wu, Jiawei Wu, L. Q. Wang, X. M. Wu
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Aiming at the flexible hinge is often affected by external random variable loading operating noise fluctuation and complex factors, the fatigue degradation or failure is lack of analysis methods and that causes weak link of fatigue life analysis is difficult to find in the engineering practice. This paper introduces fatigue analysis method combines the fatigue of rain flow counting method and Pam Glen palmgren Miner theory. The article uses random load-time history to deal with cyclic loadings by rain flow counting method. Calculate the flexible hinge fatigue damage with the S-N curve in different stress. The fatigue life and the design of the weak link are obtained under random variable loading through simulation with ANSYS. The strategies are given to improve the anti-fatigue for rectangular flexible hinge which improve the deficiencies in the design. This method has instruction and reference value to actual project.

Dynamics of a Relationship Between Quality and Productivity in the Automotive Manufacturing Industry

Tshepo Mpshe, Grace Kanakana
Tshwane University of Technology, South Africa

Management of quality and productivity as key performance areas in automotive industry is important for the success of companies in the industry. Conflict that is left unmanaged between quality and production departments can lead to overall deterioration of objectives and failure to protect the interests of investors. This study uses data from an automotive components manufacturing company to determine the nature and strength of a relationship between quality and productivity. Product recalls from customers and warranty costs are an embodiment of this conflict and costly to all involved.

Results obtained show a positive relationship between the two variables: quality and productivity. Feedback obtained from interviews support the data analysis results and make recommendations for improvements to both variables.

Bayesian Sampling Plans with Interval Censoring

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In this paper, the Bayesian approach is employed to establish acceptance sampling plans for life tests with interval censoring. Assume that interval data have a multinomial distribution, and the interval probabilities are random and vary from lot to lot according to a conjugate prior of Dirichlet distribution. A Bayes risk is defined with a suitable loss function and a predictive distribution. Optimal Bayesian sampling plans are determined by minimizing the Bayes risk per lot. An example is used and some optimal Bayesian sampling plans with three equally-spaced intervals are tabulated for illustration. Sensitivity analysis are conducted to evaluate the influence of the parameter of prior distribution, the cost per sampled item and the cost per used unit time on the proposed Bayesian sampling plans.

Scaffolds and Design Factors to Increase Creative Outcomes in Teaching Software Design and Testing

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Graduates are expected to be able to provide holistic solutions, capable of meeting diverse objectives simultaneously. We aim to investigate how students would conceptualize, make sense, desire to know, find solutions and subsequently progress to collaborate, communicate and create new artefacts. We hypothesize that there would be a higher likelihood of better quality design process, explanations as well as modelling outcomes if first, students can relate between the ability to analyse problems with the ability to conceptualize/model and second, the design of the task focuses on not only functional but more importantly sustaining positive user experience. Findings highlight the importance of key design factors likely to contribute to more creative outcomes.

Entrepreneur's Priority Traits on Creative and Innovative Behavior in Technology Era – Case of Innovative New Start-Up Businesses

Mei-Chen Lo[1], Yi-Chuan Hsu[1], Martin Drozda[2]
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[2]*Slovak University of Technology, Slovakia (Slovak Republic)*

Creativity and innovation activities become an important way of entering new business mode. And it becomes a tool in the process of introducing new technologies to production and commercial phases. This paper presents a theoretical exploration of the construct of corporate entrepreneurship and demonstrates different aspects of entrepreneurship on creative and innovative behavior and their relative importance in technology era. A hierarchical model is developed with multiple criteria to evaluate the alternative concepts in approaching creativity and innovation process on the corporate level. The presented model appears to be comprehensive, flexible and easy to implement in managerial practice. The illustrative example shows that in the cases of mature companies, the self-cultivation becomes a focus point of the innovation and creativity process.

Organizational Structure and the Dynamics of Collaboration Relationship

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Organizational structure is of great importance for the governance of the collaboration process. In this paper, in order to support substantial governance, a holistic collaboration organizational structure is established. Three dimensions including specialization, institutionalization and centralization are highlighted for the interpretation, where types of collaboration are further classified as improvised and organized. Moreover, relationships between organizational structure and the dynamics in collaborations are clearly identified, to shed some light on the theory of collaboration management. A survey based on the experience of organizations was further conducted for the analysis. In the end, the general organization structure system of this work was confirmed to hold high reliable properties and the hypotheses regarding the impacts of organizational structure on the collaboration trust and commitment can also be proved. All these are composed as a theoretical basis which helps to bring sound decision support for the strategies of collaboration.

The Effect of Buy-Back Policy in Air Cargo Revenue Management

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[2]*The Hong Kong Polytechnic University, Hong Kong SAR*

In order to hedge against demand fluctuation after an intermediary has booked cargo space from an asset provider, buy-back policy has been applied in revenue management. This practice allows both the asset provider and the intermediary to buy back or sell reserved capacity options. This study seeks to apply the financial buy-back concept into the logistics domain by incorporating the Hellermann's capacity option model into the Black-Scholes pricing model. The proposed model was verified by practical air cargo booking data. The experiment results showed that the buy-back policy is capable of increasing the revenues from both the aspects of asset provider and intermediary. The developed model serves as a potential framework for the air cargo participants to handle their booking capacity during the period of order release and order execution.

The Optimal Ordering Quantity Model Under the Uncertain Food Safety Environment with a Risk Aversion Concept

Shu-Yen Hsu, Tyrone T. Lin, Chiao-Chen Chang
National Dong Hwa University, Taiwan

Under the deterioration of the food safety environment of food suppliers and the uncertainty of the food safety of the purchased food by individual manufacturers, this study aims to establish a mathematical model standard basis as a reference for decision evaluation on the optimal order quantity of food raw materials to satisfy the maximum expected returns, according to the food safety situations and market acceptance (optimistic/normal/pessimistic), thus affecting procurement costs and selling prices. Assume that product costs and selling prices under different market environments will change; at the same time, importers are allowed to urgent order processing when out of stock issues and surplus products will be sold at discounted prices. Under the importers' attitudes to risk aversion, mathematical models are established to meet the importers' maximum gain and maximum utility function of optimal order quantity decision.

Employing a Bridge Triage Method in Municipalities with Decreasing Populations: An Empirical Analysis of the Characteristics of Road Networks

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[2]*Kanagawa University, Japan*

Japan's ageing population is depopulating the country and causing severe levels of debt. A consequence of these problems is that it has become difficult to maintain Japan's many bridges. Given the challenge of maintaining these bridges, we believe it is necessary to formulate plans that include discontinuing the maintenance on certain bridges. Therefore, we propose a triage method for managing bridges (e.g., highway bridges), much like the triage used by medical institutions to handle the large number of injured people after a severe disaster. The road network patterns can be used to decide whether to rebuild a bridge after the current one is decommissio-ned, as well as to calculate the demographic energy, the integrated time value of demographic energy, and the costs of operating and maintaining the bridge. We can create sequences for the decommissioning of each bridge using them as an index.

Energy for 2030 Scenarios for a Sustainable Future: A Case of Sri Lanka

Amila Withanaarachchi, Julian Nanayakkara, Chamli Pushpakumara
University of Kelaniya, Sri Lanka

Literature states that most successful corporations and nations have used scenarios as a tool to
lead the energy sector. Accordingly, the objective of this paper is to develop scenarios of Sri Lankan energy future to picture the Sri Lankan renewable energy sector by year 2030. This study presents a seven step scenario development model to develop scenarios. The seven steps comprises defining objective of scenario planning, environmental scanning, key factor analysis, prioritizing the key factors, define the assumptions in writing scenarios, framework scenarios, and finally elaborate scenarios. Following the stated seven steps four scenarios named 'Land of Republic,' 'Green Paradise,' 'Drowning Island' and Black Island' were developed. The scenarios were developed base on two key variables. The path to the scenario, the outcome of the scenario and finally the early warning signals were presented when describing the scenarios.

Session	Production Planning and Control 1
Date	7/12/2015
Time	14:00 - 15:30
Room	MR334
Chairs	Mojahid Saeed Osman, Laith Hadidi

Dynamic Job Sequencing in Two Parallel Two-Machine Flow Shop

Mojahid F. Saeed Osman
American University of Sharjah, United Arab Emirates

In this paper, the case where there are two parallel two-machine flow-shops available to process jobs is considered. We developed a method that creates sequences intended to dynamically minimize the makespan while jobs are added overtime. The solution procedure developed in this research is demonstrated using an illustrative example. The results revealed the effectiveness of the proposed approach for solving dynamic sequencing problem with two parallel two-machine flow-shops.

Research on Single-Level Lot-Sizing Problem under the Time-Varying Environment

Jie Zhang, Jianrui Dong, Yiyong Xiao
Beihang University, China

Lot-sizing problem is one of the most important issues in the production planning area and a large number of related research works can be found in literature. However, most of the works only consider the problem in a steady environment, without taking into account the time-varying production conditions that may change timely in some industrial applications. In this paper, we present the time-varying single-level lot-sizing (TV-SLLS) problem and describe it with a mathematical programming model. New properties of this problem has been analyzed, and several theorems have been developed. We propose a dynamic programming algorithm as an exact solution approach for the TV-SLLS. Problem examples and numerical calculation have been provided to evaluate the solution approach and the optimality.

An Integrated Non-Cyclical Preventive Maintenance and Production Planning Model for a Multi-Product Production System

Xuejuan Liu[1], Wenbin Wang[1], Tian Zhang[1], Qingqing Zhai[2], Rui Peng[1]
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[2]*Beihang University, China*

This paper integrates non-cyclical preventive maintenance and tactical production planning into a multi-product production system. In such a system, a set of products needs to be produced in lots during a specified finite planning horizon. Non-cyclical preventive maintenance is carried out at the end of some production periods and corrective maintenance is always performed at a failure. Both maintenance activities and setup result in downtime during the planning horizon. Procedures are proposed to discover the optimal production plan and preventive maintenance sequence simultaneously, our objective being to minimize the sum of maintenance, production, setup, inventory and backorder costs within the planning horizon. A real case from a steel factory is presented to illustrate the model.

Factors Affecting Schedule Nervousness in the Production Operations of Airline Catering Industry

Narat Hasachoo, Ruedee Masuchun
King Mongkut's Institute of Technology Ladkrabang, Thailand

The airline catering industry is one of the most complex operational systems since caterers need to serve an average of one hundred thousand meals daily with the challenge of unavailability of exact order numbers right up until departure time. Typically, an optimally planned operation schedule is issued that seeks to utilize resources usage, e.g. manpower and machines. Due to the existence of schedule nervousness, operations schedules are unavoidably sub-optimally executed. The aim of this research was to identify operations-related factors that affected schedule nervousness in the production operations of an airline catering company in Thailand. Total data of 5,572 orders from two planning horizons was collected for analysis. Nervousness was quantified by the revision in initial planned schedule and tested with operation-related factors for the relationship. Results showed that forecasting inaccuracy has a positive correlation with schedule nervousness, while an occurrence of buffer stock has a negative relation.

Comparative Research on Operation Models of Reverse Logistics

Yan Peng, Yuan Zhao
Tianjin University, China

Through mathematical modeling, this paper analyzes three operation models of reverse logistics including manufacturer take-back, retailer take-back and third party take-back. The optimal solutions of the take-back price, the take-back quantity and the profit of manufacturer a resolved from these models, and two inferences are obtained from the comparative analysis of these optimal solutions. Furthermore, because the take-back market competitive situation is influenced by the residual value of take-back products, the market environment can be divided into two different styles that are referred as to competitive market and regulative market. The brief analysis of the two markets characteristics shows that the two inferences are suitable for both them.

A Spreadsheet Based Genetic Algorithm Model for Hybrid Flowshop with Batch and Discrete Processors

Siew-Chein Teo
Multimedia University, Malaysia

This paper proposed a spreadsheet based genetic algorithm (SGA) model as a practical approach to solve a complicated hybrid flowshop (HFS) with multiple unrelated batch and discrete processors, stage skipping behavior, setup times, and machine eligibility restrictions. The proposed model is capable to handle three crucial and inter-dependent decisions which include batching, loading and sequencing. The scheduling problem involved sequence dependent setup times in discrete stages; parallel batch processors with incompatible and compatible job families at the first and last stages of the HFS, respectively. The computational results show that the model can provide good solutions in a reasonable CPU times for the HFS under study.

Building Priority Strategies of Brand Equity Measurement with AHP – Case of Mobile Companies in Taiwan

Mei-Chen Lo[1], Yi-Chuan Hsu[1], Martin Drozda[2]
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[2]Slovak University of Technology, Slovakia (Slovak Republic)
The complexity of enterprise has increased along with advance in technology and increases in development speed. Branding concerns in both producer and customer for market feedback are the keys to running an efficient branded company. Therefore, this paper uses upon brand equity theory to propose a model from two different aspects (by producers and by customers) to view product/service branding behavior features. This is done by aggregating the synthetic performance value of all possible alternatives and strategies in multiple attribute decision-making (MADM) problems. This process is based on the results of an empirical study where the Analytical Hierarchy Process (AHP) technique was employed to survey the performance of brand equity measurement system upon strategy management enquiry. This study aims at quantifying relative priorities for a given set of alternatives, based on the intuitive judgments of the decision-maker in seeking consistency within the comparison of alternatives in the decision-making process. From the overall synthesis performance value, the results demonstrate consistent results of the top five alternatives, indicating that perceived quality, brand knowledge, brand credibility, brand image and brand identity are the issues of the most improvement.

Contractor Selection in Construction Industry: A Multicriteria Model

Maria Creuza Borges de Araújo, Luciana Alencar, Caroline Mota
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Contractor selection is a strategic question for the construction industry since the suppliers have an important role in projects performance. Two essential issues in this process are the choice of adequate criteria and methods of supplier's evaluation. Therefore, this paper proposes a model for contractor selection in the construction industry. Normally, this selection is considering a group decision problem, since various departments are influenced for this choice and its managers participate of the process. Moreover, this paper focuses on the situation in which the company wants to select a set of contractors, maximizing the use of resources according with the constraints imposed. In this context, the model proposed considers the interaction between a Group Decision and an Integer Programming models. Afterward, it was made a numerical application of the proposed model. The criteria used in this simulation were identified from a literature review in papers related to the supplier's selection in the construction industry.

Classification of Areas Using a Multiple Criteria Approach for a Public Security Problem

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This study presents a multiple criteria decision model, integrated with a georeferencing information systems, to identify and classify the most violent areas from a previously defined region. For this study, we analyzed a neighborhood called Boa Viagem, in Pernambuco, Brazil, where a set of factors influencing criminality were considered to indicate an increase of violence. We applied the multiple criteria Dominance-based Rough Set Approach in order to classify sites from this neighborhood. Subsequently, we present alternative strategies to prevent crime according to each region, as the result of the final classification. Therefore, the proposed approach can be combined with a georeferenced graphical environment, revealing a valuable approach to propose solutions and strategies to combat crime.

On a Staged Successive Approximation Procedure for Approximate Dynamic Programming Solutions to Board Game Playing

Eiji Mizutani
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In board game playing, many endgames may be solved based on dynamic programming (DP) with value-to go functions that evaluate each state towards final winning positions.We first identify all positions to win in one move; next, recognize the next set of positions to win in two moves; and then do so in three moves, and so on. In this way, the sets of constant values (moving towards winning) are produced sequentially. This observation motivates our interest in what class of board game problems does the computation of starting points of constant value work efficiently. Furthermore, certain situations may arise repeatedly during the play; this corresponds to a problem where some values on the right-hand side of Bellman's DP optimality equation are unknown when the specific value function on the left-hand side is evaluated. To resolve this issue, one may typically employ Bellman's successive approximation procedure directly on a whole large problem, but we could exploit the aforementioned observation; that is, we organize the procedure in a sequentially stagewise fashion, starting with an initial smallest sub-problem to final outcome; then, advance to the next smallest local sub-problem, using approximate solutions of the previous sub-problems. Proceed in this manner until the desired problem scale is reached. We demonstrate this local-search idea (called staged successive approximation procedures) in a two-player board game found in the literature.

Decision Evaluation and Analysis of Optimal Functional Training Time Investment in Aesthetic Medicine

Hui-Tzu Yen, Tyrone T. Lin
National Dong Hwa University, Taiwan
This paper aims to establish the optimal training investment time criteria for aesthetic medicine practitioners. We built a cost analysis mathematical model taking into consideration the maximum benefit of businesses in the aesthetic medicine industry and the incidence of medical errors and disputes. Specific functions are assumed for medical errors/disputes, training costs, and profits. This model optimal training time investment is constructed as a reference for industry, with the hope of reducing risks appropriately to obtain maximum benefit.

Application of the Binomial Switch Option in a Decision Analysis for an Art Exhibition

Wen-Tsung Wu, Chie-Bein Chen
National Dong Hwa University, Taiwan
This study investigates the feasibility of the Picture Book Kingdom Exhibition featuring works by the "Magician of Colour" Květa Pacovská. Net present value was introduced into a switch options binomial valuation model to analyse the feasibility and the effect of project value on city exhibition investment. A mathematical model was also applied to construct investment strategies in order to obtain the greatest economic value and provide curators with a reference for the future selection of cities for exhibitions.

A Rough Set Based Fuzzy Axiomatic Design Approach in Evaluating Customer-Centric Design Alternatives

Pai Zheng, Shane Xie
The University of Auckland, New Zealand
Nowadays, companies strive to provide products that meet individual customer needs and expectations to achieve high profits. Customers' perceptions play a significant role in the design process. However, they are normally expressed using linguistic words which are hard to interpret, especially when trying to evaluate the best design solution among multiple design alternatives. This paper proposes a rough set based fuzzy axiomatic design (AD) approach to guide the design decision-making process which contains imprecise information. It aims to overcome the subjectivity of fuzzy membership functions selection by using rough method instead, to deal with vagueness. The approach utilizes the information axiom of AD principles and extends it to support customer-centric multi-attribute decision making. A comparative case study on bicycle frameset is conducted to validate the approach. The result shows that it has advantages compared to the fuzzy approach in processing linguistic assessments and is better suited for customized product design decision support.

The Competitive Strategy in Global Engineering Industry: Strategic Group Analysis

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The engineering is an advanced and complex field which is highly based on experiential technological knowledge, subject to construction and plant industry. Engineering also has spillover effects on relevant industries. Although upstream stages of engineering account only for 5-10% of total project values, they influence entire value chain processes in construction/plant projects. The government also recognizes the importance and pays attention to engineering industry.

Nevertheless, there are very few studies that identify and analyze behavioral characteristics of engineering firms. Accordingly, this study identifies the behavioral patterns of firms engaged in global engineering industry and infers their strategies. We collected statistical data and developed indicators of Globalization and Diversification to examine corporate activities. Then, we visualized a strategic group map to analyze behavioral patterns by using the indicators. The analytical framework and methodology proposed in this study can be used as an important tool for strategic decision making and policy development.

Understanding Household Electricity Saving in Taiwan Through the Theory of Planned Behavior: Focusing on Differences Between User Types

Pei Ling Liu, Hung Chih Lai, Yao Cheng Yu, Iris Hsia-Pei Liu, Poyi Chen, Chia-Chun Chen, Yi-Min Tuan, Hui Shan Kuo
National Taiwan University, Taiwan
Through a large-scaled quantitative research based on the theory of planned behavior, we intended to find out why people in Taiwan usually do or don't do electricity-saving behaviors at home. Four user types were discovered based on their goal, attitude, and behavior of electricity usage. By understanding the needs of different user types, we can take advantage of knowing users' needs to try to change their attitudes or to increase their energy-saving intentions.

Explore the Effects of Interfirm Cooperation and Collaboration Between Supply Chain Integration and Service Innovation Performance

Tsai Wei-Chen
Aletheia University, Taiwan
This paper examines the impact of key supplier and buyer integration activities as product co-design and information sharing with supplier and buyers as well as their impact on service innovation performance. It contributes to existing studies by asking how such integration activities affect service innovation performance in both direct and indirect ways. Among a sample of 215 logistics service firms in Taiwan by the questionnaires survey were collected, the principle findings indicate that the supply chain integration are positively related to the interfirm cooperation and collaboration. Product co-design and information sharing are also important in interfirm cooperation and collaboration activities with supplier and buyer. More importantly the data show that the interfirm cooperation and collaboration with supplier and buyer have the significant effect on the relationship between supply chain integration and service innovation performance. We hope these results have implications for both education and practice.

Design and Development of a Performance Evaluation System for Aircraft Maintenance Industry

Kam Hung Ng, Hau Man Tang, Carman Ka Man Lee
The Hong Kong Polytechnic University, Hong Kong SAR
This paper aims at developing procurement Key Performance Indicators (KPI) system for Maintenance, Repair and Operation (MRO) items using a Business Intelligence tool. A set of typical KPI has been established in an aircraft maintenance enterprise through a case study. The result analyzed by business intelligence tools, has become a critical factor in evaluating the success of financial performance, quality assurance, order fill rate, utilization of productivity and development of knowledge hubs in the procurement sector. An effective and efficient procurement strategy evaluation system is proposed in order to resolve corporate problems, with solid supporting data, improved procurement performance management, facilitation of decision making and procurement evaluation by saving resources and time. The significance of this paper is that we delivers a proactive approach by integrating KPI and BI tool for an aviation maintenance enterprise to access comprehensive external data directly, and to visualize the company performance for formulating strategies and analyzing industrial informatics.

Digital Services Innovation for Aging-in-Place

Q.Z. Yang, C.Y. Miao, Z.Q. Shen
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The world is aging, and aging fast. One of the fundamental challenges facing the aging world is the increasing demand for elderly care services. Digital services innovation, as a key enabler to satisfy this demand, has been emerging to provide higher convenient, more efficient and cost effective access to aged care services in elders' homes and communities for them to age-in-place. Despite the surge in digital innovations, research on their implementation for aging-in-place has been limited. The objective of this review is to examine and synthesize research findings in literature and, based on this and our aging project knowledge, develop an implementation framework to provide guidance for aging-in-place efforts. The guidance is focused on five core implementation concepts (the process; key stakeholders; ICT platforms; implementation environments/settings; and iterations of influencing factors, their addressing strategies, and evaluations) for successful implementation of digital services innovation into aging-in-place practice.

Impact of Values on Subjective Well-Being of the Post-80s Generation

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This study explored the value priorities of the post-80s generation in China major cities and its impact to individuals' subjective well-being (SWB). Data were collected using questionnaires about values and SWB. Samples of 249 adults who were born in 1980s from Beijing, Shanghai, Guangzhou, Shenzhen participated in online questionnaire survey. The results show that: (1) Top to down, value priorities are: family, security, harmoniousness, virtue, freedom, enjoyment, relationship, tradition, success and innovation. (2) Virtue, family and relationship are positively correlated with SWB. Success and enjoyment are negatively correlated with SWB. (3) The SWB of feminine values dominated group is higher than masculine values dominated group (feminine values: harmoniousness, virtue, tradition, security, family and freedom; masculine values: success, innovation, relationship and enjoyment). The implications of these findings for research and practice are discussed.

Service Innovation Development through China's New Urbanization: An Economic Policy Perspective

Weilin Zhao
Fujitsu Research Institute, Japan

Although there is no agreed-upon definition of service innovation, its impact on society and firms has been considered to be generally significant. To date, many researches have been conducted on service innovation or service-based strategies for firms, but relative to the many discussions on firm-layer service innovation, there are few on the relationship between service innovation and country-specific economic policy.

Following China's rapid economic growth, industrialization, and urbanization over the past 30 years, the Chinese government has been promoting new urbanization in recent years as the engine for its sustainable economic development and the source of innovation in different areas.

This paper discusses the development of service innovation under China's new urbanization from an economic policy perspective and aims to contribute to research on innovation and economic policies.

MOD Traffic Packet Loss in Video Streaming for End-Users' Continuous Using Willingness

Tze-Jen Wang, Chie-Bein Chen, Chia-Sheng Lu
National Dong Hwa University, Taiwan

In Taiwan, Chunghwa Telecom MOD launched first connected TV for IPTV, however, they faced a great challenge at the same time. Their primary task is to provide good quality service to clients, in other words, the quality and content of IPTV must meet and exceed the current traditional TV broadcast (for example satellite and cable TV providers.) To reach the goal, the Quality of Service (QoS) of video streaming plays a significant role which leads to a more complex internet construction.

In this study, the packet loss type is the variable and we try to investigate the influence of packet loss type for end-users' continuous willingness to use MOD. Here, the results are:

(1) There is significant influence between the frequency of packet loss and end-users' continuous willingness of using MOD;

(2) The low frequency of losing packet results in higher continuous willingness of using MOD

Tacit Knowledge Transfer and its Implementation on Small and Medium Enterprises

Augustina Asih Rumanti, Trifenaus Prabu Hidayat, Yeremia Dwi Saputro
Atma Jaya Catholic University of Indonesia, Indonesia

Tacit knowledge is one of the most crucial factors in the SME (Small and Medium Enterprises) business, including in the field of production. The production comes from the work force who possesses certain amount of tacit knowledge. A model of the transfer of tacit knowledge to empower SME will help workforce to extract it easier. This research explains a model of the transfer of tacit knowledge that focuses on the transfer of knowledge at organizational level of SME. The models consist of six constructs: sources characteristics, receiver characteristics, tacit knowledge characteristics, organization context, media characteristics, and the effectiveness of the transfer of tacit knowledge. The validation of this model is conducted in Surya Usaha Mandiri SME that create coconut shell handicrafts in Bantul, Yogyakarta, Indonesia. The data computation is conducted through Structural Equation Modeling method. The result shows that the data influential factor towards the sources characteristics, receiver characteristics, tacit knowledge characteristics, organization context, media characteristics, and the effectiveness of the transfer of tacit knowledge. Conceptual model needs to be improved.

Evaluation of Smartphone Feature Preference by a Modified AHP Approach

Faith Ho, Chia-Nan Wang, Chengter Ho, Yu Cheng Chiang, Ying-Fang Huang
National Kaohsiung University of Applied Sciences, Taiwan

This research aims to study the customers' preferences ranking of smartphone attributes and the price range preferences among customers. A modified AHP is conducted in order to meet the research objective. Smartphone features were selected from previous research to construct the hierarchy structure. The AHP scale between two criteria was simplified to 0 ~ 1 in order to conduct an online survey. 389 samples were collected through the survey. The weighting of the criteria were then calculated to sort out the ranking.

The results showed that the performance of the processor is regarded as the most important element when purchasing a smartphone, following by the price and battery endurance. The most preferred purchase price is NT$6,001~15,000, which might due to the compromise between processor and price.

An Application of Text Mining to Understand the Productivity Challenges in Singapore

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Singapore Institute of Manufacturing Technology, Singapore

The issue of low productivity growth and reliance on foreign labour are major concerns in Singapore. Traditionally, identifying productivity issues usually involves an expert's opinion or market surveys. These methods might be biased or labour intensive. In this paper, we consider an alternative method, a data-driven approach using text mining. Various text mining techniques are applied on the data collected from 87 companies that participated in an operational excellence programme. The results indicated that even though the set of productivity issues for companies residing in Singapore are similar, the severity of the problems differs across different types of industries. Furthermore, we also found that companies from different industries tend to adopt different methods to solve their productivity issues.

Unpacking the Developmental Process of Shared Mental Model Between Technologists and Artists

Han-Chang Ling[1], Chao-Tung Wen[1], Hsueh-Liang Fan[2]
[1]*National Chengchi University, Taiwan*
[2]*Ministry of Science and Technology, Taiwan*

It is desirable to integrate knowledge of team members toward performance. However, a smart team does not always perform as expected, especially when the team members differ in their knowledge backgrounds. Previous literature has indicated that team members must develop a shared mental model (SMM) such that their actions are effectively coordinated and innovations are induced. Scholars noted that SMMs did not become more similar as predicted in work teams with complex task however. This inconsistency has yet been resolved. This study conducted a case study to explore how multiple SMMs were developed in a heterogeneous work team in the process of achieving a complex goal. The results of this study showed that SMMs are grown as a hierarchical structure. In such a structure, superordinate SMMs work as a more robust frame in which subordinate SMMs are developed. Based on such a robust frame, subordinate SMMs are more locally developed and thus enhance team efficiency. Superordinate SMMs are revisited when the team appeals for innovations.

Managing Interdisciplinary Research Clusters

Sarah Müller, Thomas Thiele, Claudia Jooss, Anja Richert, Rene Vossen, Ingrid Isenhardt, Sabina Jeschke
RWTH Aachen University, Germany

The complexity and dynamicity of interdisciplinary research clusters requires an efficient management in order to ensure a good performance. Therefore, this paper presents an iterative regulatory process for managing interdisciplinary research clusters which has been implemented at the two clusters of excellence at RWTH Aachen University. Thereby, an annual evaluation of the cluster performance through a cluster-specific employee survey forms the basis for the derivation and implementation of different measures. By evaluating the performance again, the loop of organizational learning starts anew. As one example of these measures, the colloquia of employees are described in further details because the adaptation and optimization of concepts illustrate the effects of the continuous improvement. Furthermore, the general performance development of the cluster was analyzed to show the comprehensive effects of the regulatory process.

Intelligent Mining on Purchase Information and Recommendation System for E-Commerce

Weikang Xue, Boping Xiao, Lin Mu
Beihang University, China

As an important marketing tool, recommendation systems for e-commerce offer an opportunity for merchants to discovery potential consumption tendency. This paper puts forward a novel recommendation algorithm to make the recommendation system more accurate, personalized and intelligent. Firstly, we use intelligent mining on purchase information, and regress consumer preference rating on click behavior. Secondly, we use Bipartite Network Recommendation model based on resource allocation and improved collaborative filtering model; the former abstracts products and consumers into nodes in the graph, and finds the correlation of products that recommend to others using alternative relation; and the latter solves the problem, caused by sparse data, by compressing rating matrix and predicting null values. Finally, according to Alibaba e-commerce customers purchase data, we verify that Hybrid Recommendation Model optimizes the accuracy and coverage of the recommendation results.

Why is Your E-Store Popularity Always Lower?

Te-King Chien[1], Hon-Yu Ma[2], Kai-Chi Yang[1]
[1]*National Formosa University, Taiwan*
[2]*Ten-In Food Co., Ltd, Taiwan*

Due to improper operational activity the failure rate of online store is still high. By investigating the main cause, it is that the operators cannot grasp the E-store popularity, websites industry type and attribute category.Therefore, this research (1) grasps the website attribute of E-store by reviewing literature; (2) sets up "E-store website attribute structure", through qualitative method; (3) establishes "industry breadth and depth graph", so as to find the website content equilibrium degree of various industries' E-store; (4) constructs "the attribute category decision index of industry types", to find the difference in performance adequacy of various attribute categories under various industry types, and further obtain improvement strategy. It is believed that this research result not only assist enterprise clearly grasp advantageand strategy of E-store website attribute, but more accordingly promote the effectiveness in resource utilization and the probability of success.

Humanizing Websites: Website Personality for E-Services

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[2]*Multimedia University, Malaysia*

Unlike physical services, e-services lack human interaction, which calls for them to be designed in a more human-like way. From the conventional marketing perspective, the concept of brand personality is used to explain the human characteristics associated with a brand. Regrettably, existing brand personality dimensions are context-specific and are often developed using physical products and services. This study advances the field of humanizing websites by identifying the set of website characteristics appropriate for e-services, specifically in terms of online banking services. Drawing from the interpersonal-relationship theory, this study further examines the relationship between website personality and how the customer relates to the website in terms of trust, commitment and satisfaction towards their online banking website services. In order to complete this investigation, 397 accounts of usable data have been gathered from online banking customers. A two-steps analysis using PCA and PLS-SEM resulted in the identification of three website personality dimensions that are unique to online banking services, with a varying degree of effect on customer trust, commitment and satisfaction.

The Impact of IT Governance on Performance of IFRS Conversion Under ERP Systems

Wen-Hsien Tsai, Po-Yuan Chu, Jui-Chu Chang, Hsiu-Li Lee, Yi-Chin Huang
National Central University, Taiwan

In response to the international trend, in recent years companieshave officially adopted the International Financial Reporting Standards (IFRSs) and need to perform upgrade or adjustment to their Enterprise Resource Planning (ERP) systemsfor the IFRS conversion. Information technology (IT) governance in an ERP system environment will become akey that cannot be ignored by the management. To investigate the impact of implementing IT governance in an ERP environment on the effectiveness of ERP implementation and IFRS conversion The findings are as follows: Effective IT governance in a company can improve the project performance of ERP implementation; The improvement of the information quality and system qualityofan ERP system candemonstrate the effectiveness of the IFRS conversion through the ERP system; The project performance of ERP implementation can improve the information quality and system quality of the ERP system as well as the effectiveness of the IFRS implementation.

The Impact of IT Management Process of COBIT 5 on Internal Control, Information Quality, and Business Value

Wen-Hsien Tsai, Chu-Lun Hsieh, Chung-Wei Wang, Chuan-Tu Chen, Wei-Hsiang Li
National Central University, Taiwan

COBIT 5 is a framework, released in 2012 by ISACA, which can help enterprise set governance objective and plan strategy effectively, to make enterprise create business value. It can be used to identify and manage risk and intensify the IT services. COBIT 5 framework can align IT objectives with business objectives, and minimize the IT risk to get the final objective of creating business value. This study investigate the impact of management process of COBIT 5 on internal control, IT governance objectives, information quality, and business value. The main findings of this study could help enterprise understand that: (1) The IT management process of COBIT 5 has a significant direct impact on internal control, IT governance objectives, information quality, and business value; (2) The IT management process of COBIT 5 can also influence the business value through internal control, IT governance objectives, and information quality; and (3) The successful IT management process of COBIT 5 can help enterprise achieve COBIT 5 governance objectives, and then realize the ultimate goal of creating business value.

Evaluating the Effectiveness of Online Product Planning and Layout Tools in Online Apparel Shopping

Kin Meng Sam[1], Chris Chatwin[2]
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[2]*University of Sussex, United Kingdom*

In online businesses, each product item has its specific product page where online consumers can adopt different online product planning and layout tools (OPPLTs) to select their most suitable product items. The product page is usually the first page that online shopping agents are directed to. As a result, a product page plays an important role in the success of online businesses. In this research, the impact of online consumers' perceptions about the usefulness of different OPPLTs on consumers' intention towards online apparel shopping is analyzed. The purpose is to obtain knowledge about the effectiveness of each OPPLT in influencing online consumers' shopping intentions. The results can provide guidance for online businesses so that their product pages can be designed effectively.

Applying Fuzzy Delphi method and Fuzzy AHP for Performance Measurement of the Government Information Unit

Yi-Hui Liang
I-Shou University, Taiwan

Government departments must consistently improve public services to match the rapidly changing information technological environment and growth in numbers of users, and information units is the most challenging among the various required adjustments. The purpose of this study is to establish a model for performance measurement of the government information unit based BSC (Balanced Scorecard), and uses the fuzzy Delphi method and the fuzzy analytic hierarchy process to measure the government information unit performance. This model can be utilized by the information units of the elementary and secondary schools for performance measurement.

Effects of Culture on Project Management Contributing to the Success of Managing Culturally Diverse Engineering Teams in a Global Environment

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The research in this paper measured the Cultural Intelligence capability of engineering project leaders and team members from around the world, and their awareness of cultural influences on project management. The focus was on comparing South African engineers to those in other countries. It was concluded that intercultural communication and differences in decision-making were two primary cultural factors influencing the success of managing culturally diverse engineering teams.

On an Application of Microsoft Excel's Evolutionary Solver to the Resource-Constrained Project Scheduling Problem RCPSP

Norbert Trautmann, Mario Gnaegi
University of Bern, Switzerland

The Solver Add-in of Microsoft Excel is widely used in courses on Operations Research and in industrial applications. Since the 2010 version of Microsoft Excel, the Solver Add-in comprises a so-called evolutionary solver. We analyze how this metaheuristic can be applied to the resource-constrained project scheduling problem (RCPSP). We present an implementation of a schedule-generation scheme in a spreadsheet, which combined with the evolutionary solver can be used for devising good feasible schedules. Our computational results indicate that using this approach, non-trivial instances of the RCPSP can be (approximately) solved to optimality.

Preventive Controlling of Product Development Projects by Aid of Predictive Analytics - Identifying Hot Spots within the Deviation Probability Map

Günther Schuh, Stefan Rudolf, Christian Doelle, Michael Riesener
RWTH Aachen University, Germany

This paper presents a concept to anticipate deviations from the target process and thus inefficiencies within development projects by aid of predictive analytics. It is stated that predictive analytics approaches can be adapted to predict deviations in development projects, comparable to the anticipation of crimes. Deviations in terms of time, costs and quality are seen as a result of waste and therefore a dimension for inefficiencies. In this context the deviation probability map is introduced as a part model of the superordinate methodology allowing the intuitive identification of deviation hot spots and enhancing preventive controlling of development projects.

Knowledge Management Maturity and Organizational Performance in Project-Based Organizations: Initial Evidence from Indonesia

Budi Hartono[1], Vicky Ramadhani[1], Yunitha Ratnadilla[1], Nurul Indarti[1], Kah-Hin Chai[2]
[1]*Universitas Gadjah Mada, Indonesia*
[2]*National University of Singapore, Singapore*

The aim of this research is to evaluate empirically the possible linkage between 'knowledge management maturity' (KMM) and 'organizational performance'. The study is carried out within project-based organizations, specifically targeting construction firms in Indonesia. Prior to the main study, an instrument to measure the two key variables are developed and tested for validity and reliability. Top or senior management representing the respective organizations are invited to the study (response rate=25.3%, n=117 after data preparation). Initial result suggests a positive association between KMM and performance. A cluster analysis is also performed to identify profiles of identified groups of construction organizations.

Methodology for the Evaluation and Selection of the Suitability of Highly Iterative Product Development Methods for Individual Segments of an Overall Development Project

Günther Schuh, Stefan Rudolf, Frederic Diels
RWTH Aachen University, Germany

Today's challenge for manufacturing companies is the fulfillment of constantly growing heterogeneous customer requirements by simultaneously delivering highest quality standards within shortest time. One way to face this challenge is the highly iterative product development approach. Its objective is the distribution of the current development process in many short and iterative sub-processes. This procedure enables a regular involvement of customers in the development process and an early validation of the development status, which jointly results in customer-specific and marketable products. However, most companies do not know how this short-cycle concept can be used in development projects. This is due to the fact that most published papers just describe the highly iterative methods, however, without considering the suitability of these methods for individual development scopes. This paper aims at the presentation of a methodology for the evaluation and selection of highly iterative product development methods depending on the individual development scopes.

Indices to Critical Activities in Stochastic PERT Networks

Koichi Nakade, Takahito Narumi
Nagoya Institute of Technology, Japan

Measurement of activities in stochastic PERT Networks is important for allocating resources to important activities. There are several well-known indices for measuring the importance of activities, but they have some drawbacks and weak theoretical backgrounds. In this paper, the theoretical meaning of the known indices are discussed by using two-value activity stochastic PERT Network, and new indices on importance of activities are proposed. Throughout numerical experiments the properties of proposed activities are compared with known indices, and one of new indices has no drawback for the cases tested

Session	Systems Modeling and Simulation 1
Date	7/12/2015
Time	14:00 - 15:30
Room	MR336
Chairs	Michel Aldanondo, Godwin Tennyson

Modeling Driver Lane Selection Decisions in a Toll Plaza

Godwin Tennyson
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A toll plaza consists of several parallel counters and an incoming driver selects a lane that minimizes waiting time. This lane selection decision is often based on the physical length and the number of vehicles in each counter. Designing a toll plaza to determine the number of counters is a complex task due to the intelligent lane selection by an arriving vehicle. A simulation model of a toll plaza with identical counters is developed and various lane selection rules are analyzed. The insights gained from the study could be used for regulating the incoming vehicles to the correct lane as well as for designing a toll plaza to provide a required level of service.

On Controllability of Discrete Systems in Probabilistic Spaces

Manuel De la Sen
University of the Basque Country, Spain

This paper investigates some controllability properties of probabilistic discrete dynamic systems. Related approximate probabilistic controllability properties are also dealt with for the case when a nominal controllable system is subject to either parametrical perturbations or unmodeled dynamics.

A Study for Establishing Ideal CRM System Function Structure

Te-King Chien[1], Hon-Yu Ma[2], Kai-Lun Hou[1]
[1]*National Formosa University, Taiwan*
[2]*Ten-In Food Co., Ltd, Taiwan*

Customer Relationship Management (CRM) is highly used in enterprise, it cannot meet the expectations of companies. Software system vendors provide services to meet enterprises' needs, but they still feel terrible disappointment. For this reason, some enterprises take self-development, but its functions and structures are incomplete and in a mess.

To work out these issues, this study presents "Academic CRM structure", "Commercial CRM structure" and an "Ideal CRM structure" through the literature review, specifications and Qualitative Interviews. In order to expose the importance of each functional category in "Ideal CRM structure", this study establishes 4 evaluation criteria and uses quantitative research methods (Fuzzy Delphi Method, TOPSIS, entropy method and AHP) to show their differences. We believe that this research result not only links academic and practical system structures, but also leads CRM towards more valuable.

Analysis of Dynamic Contact Mechanical Response and Contact Life of Low Speed Spur Gear

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The dynamic response of contact mechanics has significance important for durability and reliability design of gears. A finite element analysis model for dynamic response of contact mechanics of gear pair is established, and then the contact fatigue life of gear pair is analyzed based on the finite element model. The key parameters of contact finite element model is determined through the contact finite element analysis of thin cylinder. The precise finite element analysis model of the gear meshing is established and calculated by transient dynamics. The contact force and contact stress of different position is obtained. Through change friction coefficient of finite element model, the influence of friction coefficient for contact force and contact stress is obtained. Comparing the life of traditional risk point calculated in most of the standard and dangerous point which has the max stress through simulation. The influence of friction coefficient on contact life is determined.

Thermal Estimations to Support Buildings Retrofit: Which Envelope to Manufacture?

Andres Felipe Barco Santa, Elise Vareilles, Michel Aldanondo
Université de Toulouse - Mines d'Albi, France

In order to reduce energetic consumption, buildings may be retrofitted by covering them with an insulation envelope composed of rectangular parameterizable panels. In such scenario different envelopes configurations are possible to cover the same building. Thus, a crucial aspect of the retrofit is to select, among potential solutions, those ones providing good thermal performance at reasonable cost. In this paper are discussed which characteristics are part of a panels-made envelope, how to compute their performance and associated cost, and a bi-criteria function evaluating the envelope. We compute thermal and cost estimations with respect to the spatial positioning of panels configuring the layout. The aim of our contribution is to assist architects in their decision-making process. Conception and implementation of the thermal retrofit are then supported by our estimations.

Vehicle Routing and Scheduling for Bushfire Emergency Evacuation

Shahrooz Shahparvari, Babak Abbasi, Prem Chhetri, Ahmad Abareshi
RMIT University, Australia

Quick response to evacuate residents within a short-notice bushfire situation is vital, which can save lives. This translates to make decision on selecting shelters, assigning the vehicles, finding the optimal routes and schedules for evacuation. This study proposes a model as a decision support system that can determine the required vehicles their schedule and routes to evacuate late evacuees within the given time windows and fire propagation scenarios. Our model also considers roads availabilities and disruptions. A heuristic solution method is developed to cope with the complex nature of the Vehicle Routing Problem (VRP) based problems. To evaluate the effectiveness of the proposed model, a real case study from Australia is presented.

Posture Analysis in Ergonomic Study for Bus Station Design

Seng Fat Wong, Qili Chen
University of Macau, Macau

Bus station is one of the important facilities in mass transportation service. Nevertheless, when people are waiting for bus, they will choose different standing posture such as upright standing and leaning against wall, referring to different bus station construction. Hence the study of different standing posture provides ergonomic perspective to design bus station. The postural control in leaning-against-wall posture during prolonged standing is investigated. In present paper 20 healthy volunteers were instructed to upright stand or lean against wall for 15 minutes. The pressure distribution of foot was collected, and the standard deviation of center of pressure (CoP) in AP and ML direction and asymmetrical standing condition were analyzed. The result indicated that in leaning-against-wall posture, the percentage time and frequency of asymmetrical standing and standard deviation of CoP in AP direction are significantly different between two postures.

Selective Dissemination of Clinical Guidelines in Healthcare Communities

Juha Puustjarvi[1], Leena Puustjarvi[2]
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[2]*The Pharmacy of Kaivopuisto, Finland*

Selective dissemination of information (SDI) refers to tools and resources used to keep a user informed of new information on specified topics. In this paper, we deal with SDI in healthcare communities, which members include healthcare authorities, medical societies and healthcare organizations. We have restricted ourselves on SDI within the scope of Evidence Based Medicine (EMB). It emphasizes the use of evidence from well designed and conducted research in healthcare decision-making Further, each clinician is obliged to know the clinical guidelines of his or her profession. Our research has focused on this requirement, i.e., ensuring that clinicians are aware of the relevant clinical guidelines. We have analyzed how modern ICT-technologies such as Semantic web technologies can be exploited in this problem. The corner stones of our solution are two overlapping ontologies called the Profile ontology and the Guideline ontology. The former models clinicians' job specific aspects such as their roles, skills and competences while the latter models clinical guidelines as well as their relationships to roles, skills and competences. By means of these ontologies and a query processor (a SPARQL engine) we can connect guidelines to relevant clinicians, and vice versa.

Deciding the Minimum Staffing Level in an Emergency Medical Center During Sandstorms

Chibli Joumaa, F. Al-Ajeel, L. Al-Thuwaini, M. Al-Qallaf, N. Al-Faraj, S. Al-Muzayan
American University of the Middle East, Kuwait

This paper presents a case study of a discrete-event simulation (DES) model of an emergency department (ED) unit in a governmental hospital in Kuwait. The emergency department operations were modeled using Arena software. The simulation model was reinforced through verification and validation. Some scenarios in an attempt to determine the minimum staff level were evaluated. These scenarios show that major improvement in patient waiting time can be obtained by minor changes in the number of resources. These changes reduced the waiting times of patients by 29% in the Female Observation, by 62% in the Male Observation, by 15% in the first Examination Room, and by 23% in the second Examination Room. The relationship between sandstorm occurrences and the number of visits to the emergency department was also investigated using correlation and regression analysis. The result of the analysis was that there is a strong linear relationship between sandstorm occurrences and the number of visits to the emergency department.

Green Logistics Optimization Model for Forward and Reverse Logistics Using Genetic Algorithm

Manoj Kumar, Dinesh Kumar
Indian Institute of Technology Roorkee, India

Green logistics has been receiving much attention due to more focus mainly on environmental protection and conservation, green legislations, customer's increased awareness for clean environment, and sustainability and this drives to more importance given to environmental conservation and protection practices like recycle, reprocess , reuse and emission control to minimize economic cost and environmental effects. The reverse logistics is a key constituent of green logistics. Reverse logistics deal with the collection re-usable packaging and end of life goods for recycling or remanufacturing. The present research is encouraged by the practice oxygen delivery to the hospitals in a predefined time window. Here a genetic algorithm is applied in proposed logistics optimization model for generating routes of two models of VRP for simultaneous pickup and delivery with time window and two pick up strategies full pickups and partial pickups. Then routes are selected after comparison based on a set of economic and environmental cost factors. The experimental results show that the total cost is lower for full pickup strategy.

Capacity Allocation for Balancing Cost and Fairness in a Imaging Facility Setting

Liping Zhou, Zhibin Jiang, Na Geng, Xiuxian Wang
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Due to expensive procurement cost and high operating cost, Magnetic Resonance Imaging (MRI) is usually one of bottleneck resources in hospitals. As MRI is shared by multi-types of patients with different requirements of examinations, setup time is needed to change coil between different patient types. Therefore, the same type patients are arranged in a sequential order to reduce setup time. This paper proposes an integer linear programming model based on a long sample path of patient arrivals for optimizing the capacity allocation. The problem consists in determining the amount of capacity allocates to each type with the objective of balancing total cost and medical service fairness. Numerical experiments with various machine daily working time and setup time are performed to show the efficiency of the proposed approach and demonstrate that the proposed capacity allocation solution is better than the widely used capacity pooling solution.

Analytical Framework to Establish Requisite Bed Capacity When Cohorting Paediatric Patients

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This paper describes an analytical framework for establishing requisite bed capacity when cohorting paediatric patients by defined characteristics. As guided by the analytical framework, a simulation-based lean six-sigma approach is applied to analyze the operational data and processes when cohorting patients, and opportunities are identified for process improvement. The analytical framework is illustrated through a case study to cohort paediatric patients by medical specialty, bed class, age, gender, given number of beds-in-service etc. to minimise or avoid: (a) interchanging bed types when a patient is of an age that requires use of a different bed type; (b) mixed gender sharing of cubicles by teenaged patients; (c) crying infants and young children being housed with older patients. The outcomes show that the hospital can better assess the feasibility of different cohorting scenarios based on the resulting impact before implementing a change.

A Method of Reliability Assessment Based on Hazard Rate by Clustering Approach for Cloud Computing with Big Data

Yoshinobu Tamura[1], Yumi Nobukawa[2], Shigeru Yamada[2]
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[2]*Tottori University, Japan*

Many software services based on the cloud computing with big data are used by many users. Considering the software reliability of cloud computing, it is important for the software managers to assess the relationship between the database software and cloud software, because the cloud software collaborate closely with the database software by using the internet network. Also, it will be important to consider Apache HTTP server served as the backbone of cloud software. In this paper, we propose a method of software reliability assessment based on three–dimensional fault data clustering in cloud computing environment with big data. We perform a cluster analysis for the software fault data by using k–means clustering. Also, we propose the hazard rate model by using the results of three-dimensional cluster analysis. Moreover, we show several numerical examples of software reliability assessment in the cloud computing environment with big data.

Use of AHP for Risk Based Fatigue Degradation Inspection Analysis of Topside Piping on Offshore Production and Process Facilities

Arvind Keprate, R.M. Chandima Ratnayake
University of Stavanger, Norway

Currently, a three-staged, risk-based approach given in the Energy Institute (EI) guidelines is employed to identify fatigue critical locations on topside piping. EI guidelines provide guidance for various stages of the risk assessment. However, authors feel that the qualitative methodology employed during stage 1 for identifying fatigue critical system is cumbersome. The paper thus proposes an alternative methodology to prioritize inspection of Potential Fatigue Critical Locations (PFCLs) on topside piping based on the Composite Priority Weights (CPWs) obtained from Analytic Hierarchy Process (AHP). An illustrative case study is performed, within which the hierarchy tree structure is developed. Thereafter, the CPWs of piping locations in different units are obtained. Thereby, the locations with high CPWs are prioritized for the quantitative assessment during the stage 2 of the risk assessment.

Evaluation of Product Maturity Based on Quality Characteristic

Xiaohong Wang, Yuxiang Li, Wenhui Fan, Jinquan Xuan, Lizhi Wang, Manman Mu
Beihang University, China

In order to understand the progress and fulfillment of product development promptly, an evaluation method for product maturity is proposed. At present, most study methods of product maturity are based on product readiness level from the perspective of management. The proposed evaluation framework of product maturity is to quantify the product's inherent quality and reliability without considering the product readiness level. Firstly, the basic evaluation index system is established and for a specific product, Quality Function Deployment (QFD) would be used to build the evaluation index system based on the customer needs. Secondly, different evaluation methods are selected for different types of indexes. Thirdly, expert evaluation method or the back propagation neural network theory is used to decide the weights of indexes. Then with the evaluation values and weights of indexes, the comprehensive evaluation of product maturity would be obtained. Finally, the proposed method is demonstrated by a practical example.

An Integrated Maintenance Optimization for Multi Parallel Machines Under Withdrawal Right

Tarek Askri, Zied Hajej, Nidhal Rezg
University of Lorraine, France

This paper treaties an integrated maintenance problem of manufacturing system with considering a withdrawal and leasing constraints. We have developed an economical production policy and an optimal maintenance strategy for a manufacturing system composed by several identical parallels machines. The problem consists a numerous machines unable to satisfy a random demand over a finite time horizon, under given service level and taking into account the product returned (withdrawal right). Firstly, to obtain an economical production planning, we minimize the total production cost. Secondly, according to obtained production plan, we determine the optimal maintenance strategy for different leased machines. The key of this study is to show the impact of the product returned on the production plan and the production rates on the degradation degree of machines. An analytical study and a numerical example are presented in order to prove the developed approach.

A PSO Identification Algorithm for Temperature Adaptive Adjustment System

Qian Zhang, Sa Wu, Qi Li
Beihang University, China

In the field of reliability and environmental testing, temperature system is essential for simulating temperature conditions. The temperature system is a time-varying, large time-delay and nonlinear system. When the system parameters are changed, the target value can not reach the set-target value. The closed-loop identification is always one of the main contents in the field of industrial advanced control, the Particle Swarm Optimization algorithm is an effective clustering algorithm for solving optimization problems. In this paper, the Particle Swarm Optimization algorithm is applied to the parameter identification of the temperature system model, and the accuracy of the simulation can meet the engineering requirements.

Reliability Modeling for Dependent Competing Failure Processes with Damage Self-Recovery Phenomenon

Hanlin Liu[1], Ruey-Huei Yeh[2], Baoping Cai[3]
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[2]*National Taiwan University of Science and Technology, Taiwan*
[3]*China University of Petroleum, China*

Systems experiencing multiple dependent competing failure processes (MDCFP) have attracted much attention in the recent years. A system subject to MDCFP with damage self-recovery phenomenon is considered in this paper. Due to the intrinsic resistance to abrupt damage, the damage self-recovery exists in many systems and products. A new reliability model subject to MDCFP by considering the damage self-recovery phenomenon is developed. For each random shock, we propose recovery time and recovery level concept to describe the self-recovery process. The model is practical and realistic for many complex systems such as electrical devices or microelectronic polymeric components. Due to complexity of the model, there is no analytical form of the reliability function. However, we estimate the system reliability efficiently by using simulation method.

Session	Reliability and Maintenance Engineering 3
Date	7/12/2015
Time	16:00 - 17:30
Room	Summit 2
Chairs	Masdi Muhammad, Hennie Husniah

Reliability Modeling of Successive Release of Software Using NHPP

Amir Hossein Soleiman Garmabaki[1], Abbas Barabadi[2], Yuan Fuqing[2], Jinmei Lu[2], Yonas Zewdu Ayele[2]
[1]*Luleå University of Technology, Sweden*
[2]*University of Tromsø - The Arctic University of Norway, Norway*

This paper presents an effective reliability model for multi-release open source software (OSS), which derived based on software lifecycle development process (SDLC) proposed by Jørgensen [1]. Most of OSS reliability models are based on closed-form methodology and do not consider the properties of OSS in the model structure. The proposed model, incorporate bugs removed from pre-commit test and parallel debugging test phases. Furthermore, the proposed model is based on the assumptions that the overall fault removal of the new release depends on the reported faults from the previous release and on the faults generated due to adding some new functionalities to the existing software system. The parameters of model have been estimated on real failure of three releases of software and goodness of fit of values have been calculated. Results show that the proposed model fits the data reasonably well and present better accuracy in comparison with other methods.

Work Place Factors Effect on Maintainability in Challenging Operating Conditions

Mojgan Aalipour[1], Abbas Barabadi[2]
[1]*LuleÄĄ University of Technology, Sweden*
[2]*University of Tromsø - The Arctic University of Norway, Norway*

Some industries such as mining industry create complex and challenging work place for maintenance crews. For example in an underground mine, for some machines, heavy maintenance tasks must be performed on site in a limited workspace in a harsh environment, including dust and improper illumination. Such operating conditions can increase the health, safety, and environment (HSE) risk, reduce the availability of the machines and increase the life cycle cost of equipment. A review of current mining equipment design and maintenance procedure confirms that considerable reduction in HSE risk, as well as substantial cost savings, can be achieved by considering human factors. This study discusses the effect of workplace factors on the maintainability of mining equipment. It presents the results from questionnaires on the effect of work place factors on maintainability performance given to maintenance staff at two mines, one in northern Sweden and the other in Iran.

Importance Measures for Control Systems with Degrading Components

Huadong Mo, Bin Liu, Xun Xiao
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This paper addresses the issue of importance analysis for control systems. The control system is a complex system consisting of multiple components, where its components interact with each other in complicated mechanisms. Different form traditional systems, a feedback channel exists in the control system which dominates the system behavior in a complicated way. For such a complex system, importance measures are desired to provide insights of the dominated components and simplify performance analysis of the system. In this paper, we perform importance analysis on several typical components of the control system, namely, the controller, actuator and sensor. These components are subject to deterioration during system operation. We firstly describe the system behavior by analyzing the forward channel and feedback channel, followed by the reliability model and importance analysis. Monte Carlo simulation is adopted to compute system reliability and component importance, owing to the fact that the control system exhibits complex behaviors and no analytical solution can be achieved. Finally, a numerical example is presented to illustrate the reliability model and importance metrics.

Reliability Analysis and Identification of Critical Components Using Markov Model

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This paper presents a mathematical model based on continuous time Markov chain for performing availability and reliability analysis of a repairable system consisting of n components. It also describes a methodology for identifying a critical component based on CTMC state probabilities of a n-component repairable and non-repairable system. As an illustration, a 3-component repairable system has been modelled. A case study of conventional lathe machine has been presented to solve for state probabilities and analysed to find reliability indices, MTTF, MTBF, MTTR and Availability to provide insights and guidance on improving upon the reliability and maintainability.

Suitability of Wiener Process Based Model for Prediction of Temperature Dependent Super Capacitor Availability

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In this paper we focus on the estimation of the essential availability and reliability characteristics of super capacitors. The estimation is based on experimental data calculation using a Wiener process. The experimental data were acquired when performing the accelerated tests of super capacitors in the thermal climatic chamber Vötsch VC3 7034. Three thermal levels were used when performing the accelerated tests. Our approach presented in the paper is predominantly not focused on a failure occurrence but on performance durability and availability assessment such as functional stability. We will assess correct functioning and first hitting time if the super capacitor loses its power capacity.

Methodology for Short-Term Performance Prognostic of Gas Turbine Using Recurrent Neural Network

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The issue of performance prognosis has been a topic of considerable interest in industrial condition monitoring applications. An innovative data driven prognostic methodology has been introduced in the current study by utilizing artificial recurrent neural network (RNN) approach which intends to improve the capability of equipment performance prediction within a specified short time bound even with limited available data. The ability of the approach is demonstrated using condition monitoring parameters collected from a 20 MW industrial gas turbine. An appropriate selection and fusion of measured variables has been employed to feed RNN with the most influential performance information. The analysis demonstrated that the developed prognostic approach has a great potential to provide an accurate short term forecast of equipment performance which can be invaluable for maintenance strategy and planning.

The Research on Supply Chain Portfolio Default Risk of Financial Enterprises Based on Archimedean No.12 Copula

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In the view of supply chain finance, the default risk of the enterprise not only exists within the enterprise, but also gets along with between two enterprises, which makes it more essential to evaluate the default risk of the whole supply chain. This paper addresses on the contagion of the risk between two enterprises, selecting the financing enterprises as the research object and taking two enterprises which in the same supply chain of Chinese auto industry as sample. Then establish the Logit model based on the financial data of enterprises. Taking the probability as basis, it is possible to get the enterprise combination default probability using Copula function. Then compare it with single enterprise default probability to enhance the accuracy of supply chain financial default risk assessment. At last, provide a basis for improving the accuracy of supply chain enterprise default risk assessment.

Risk Assessment of Supply Chain Based on Combination Weighting Method and Grey Theory

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In view of the problem that it is difficult to truly quantify the evaluation index with human factors' influence in supply chain risk. To solve this problem, a method of supply chain risk assessment was proposed in this paper based on combination weighting method and grey theory. Firstly, the indexes weight was determined by the analytic hierarchy process (AHP) and variation coefficient method. Then, using the clustering assessment function of grey theory, the composite score of each assessment object was calculated by building evaluation of gray classes and whitenization weight function. Finally, the applicability and feasibility of this method was demonstrated by a case study.

Supplier Selection Decision-Making in Supply Chain Risk Scenario Using Agent Based Simulation

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Selecting the right suppliers for a supply chain is important as it can have great significance on the operating performance of the supply chain. The supplier selection problem can be quite complex as it usually involves numerous variables and uncertainties, which frequently come in the form of disruptions. This paper examines the existing approaches for supplier selection with focus on their advantages and limitations. The paper then proposes an ew approach for supplier selection based on selection criteria and agent-based simulation (ABS) to address some of the limitations.ABS models are developed for the selection based on a set of defined criteria and the scenarios of a distribution supply chain. Profit and customer service level (CSL) are used as key performance indicators (KPI)to rank the suitability of the selections. The results reveal the impacts of supplier profiles on KPIs, and these help firms to make the right decision on supplier selection.

Procurement Model Under Suppliers' Capacity Investments and Competition

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In this research, we consider a supply chain where two suppliers first compete to win a contract from a buyer. The supplies also have individual alternate markets to sell capacity. Production costs of suppliers are private information. The winner of the contract invests in capacity for the buyer as well as his alternate market. The other supplier only invests to serve his alternate market. We determine buyers' optimal sourcing strategy and the supplier's capacity decisions under such a scenario.

An Inventory Model of Production-Inventory Policy for Food Products Considering Quality Loss in Raw Materials

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The majority research on inventory model for deteriorating items in multi-echelon system assumes that a physical depletion of some inventories occurred over time. It means that the inventory is depleted not only due to the demand but also due to some deteriorated items. In food products, however, during a certain period, its quantity remains the same while its quality does degrade over time. Therefore, this study is aimed at developing a more representative inventory model in mimicking food deterioration characteristics. A mathematical model is established to represent the integrated inventory policy of procurement-production-delivery in which the total profit of the whole system is the objective function. The length of the production cycle, the frequency of raw material procurement and finished goods deliveries over the production cycle are the controlling variables. The numerical test indicates that the proposed model yields to a better profit compared to the benchmark model.

Supply Chain Analysis with Export Tax Rebate Policy

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With transnational trade becoming an important part of economic development, the related tax issue raises more concerns about multinational corporations. In recent years, tax-effective supply chain management (TESCM) is becoming an increasingly important aspect when some multinational corporations design their corporate strategies. This paper modifies the news vendor model for two different patterns (centralized and decentralized) to investigate supply chain decisions for Chinese enterprises under China's value-added tax policies and export-oriented tax policies. We find that the optimal order quantity and the profit allocation in the two patterns are both affected by the export tax rebate policy. One important observation is that the decentralized supply chain can perform better than the centralized one under certain conditions, which is different from conventional wisdom.

Industrialized Building Renovation: Manufacturing Through a Constraint-Based On-line Support System

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We present the coupling of two constraint-based environments into an on-line support system for facade-layout configuration in the context of building renovation. The configuration consists on the definition and allocation of a set of rectangular parameterization panels over a facade surface. The coupling allows solving two configuration tasks: To configure a set of questions relating the renovation model needed to determine limits for panels' size and panels' weight and to configure a constraint satisfaction model for each of the facades to renovate. Two constraint-based systems handle the filtering of incompatible values and the generation of layout plans in a web-service setup. The first service performs initial filtering to set panels' limits, based on the questionnaire, using a constraint filtering engine called CoFiADe. The second service uses several facade-layout configuration algorithms, using as underlying engine the constraint solver Choco, to generate compliant layout-plan solutions. We show that by dividing filtering and search, and by coupling the two constraint-based systems, we gain modularity and efficiently as each service focuses on their own strengths.

Evaluation of Improvement Actions Impact on Manufacturing Operational Performance

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Due to the current demands from the market, the technological improvements and action of competitors, manufacturing companies are pushed to compete in shorter product development cycles. This poses a great challenge, as the conventional product development cycle is shortened. Hence, companies are forced to introduce some improvement action plans and adopt certain manufacturing operational strategies to remain competitive and achieve a good market share. Due to the importance of this topic, in this paper we revise current manufacturing improvement plans in the literature, to establish the basis of our future research work. The findings of this work point towards the need to develop a system that integrates the evaluation of the manufacturing improvement plans in the future overall performance of the manufacturing plant and aid in the process of decision-making.

Research on the Structural Model of Quality Variations in Manufacturing and its Impact on Product Infant Failure Rate

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Quality variations in manufacturing are the root causes for product high infant failure rate. A structural model of quality variations in manufacturing composed of part-level, component-level and system-level is put forward firstly. Then the bi-variant Gumbel Copula for positive correlation quantification is tailored to obtain the correlation dependence of the three levelled variations, and the impact of the structural but correlated quality variations on product infant failure rate is conducted systematically under Weibull distribution. Finally, a case study is carried out to verify the proposed method.

Maintainability Analysis of Equipment Using Point Process Models

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The maintenance cost can be reduced significantly by applying the maintainability principle in the design and operation phase. An effective maintainability prediction procedure can highlight the designer, those areas of poor maintainability that justify product improvement, modification, or a change of design. Moreover, the analysis of field repair data is useful for a better understanding of the repair process and required time and resources that influenced the decision-making process concerning the planning of operation and maintenance activities of the plant. However, the literature on field repair data is quite scarce and they are not detailed. This paper will try to provide step by step guideline for field repair data by a case study.

Performance Evaluation for Maximum Likelihood and Moment Parameter Estimation Methods on Classical Two Weibull Distribution

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The two-parameter Weibull distribution is the most widely used distribution in reliability engineering. Parameter estimation is a key issue to apply the Weibull to practical engineering. This paper aims to compare the performance of the maximum parameter estimation method (MLE) and the moment parameter method. It firstly investigates some mathematical properties such as solution uniqueness, estimator's equivariance and the confidence interval, that are important to practice. Later on their performances have been evaluated by using simulation. In the simulation, data sets ranged from extreme small to large have been considered. Weibull distribution with increasing, constant and deceasing failure rate have been chosen in the simulation to ensure the simulation's results concrete.

Imperfect Repair Model for Complex Repairable System - A Literature Survey with Discussion

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Complex repairable system models address the dynamics of the failure and repair process. These models are critical to the maintenance optimization. This paper firstly discusses different repair effectiveness. Imperfect repair is considered as the most frequently occurred repair effectiveness. Later on this paper surveys the developed imperfect repair models in state of art. It reveals current models are more complex and they are more general. Some of them can generalize other models. However, in general, the implementation of most models are not readily, as evaluating unknown parameters, and predicting number of failures are difficult.

An Evaluation Method of Step-Down Stress Accelerated Life Test Based on Amsaa Model

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Life evaluation method of complex systems is facing main difficulties including selection of multiple failure modes or competition failure mode, and expensive test equipment and high testing costs currently. To solve this problem, a multiple step-down stresses accelerated life test ecaluation method of complex systems. We reduce the comprehensive stress to an equivalent single stress by properly designing the comprehensive stress profile. We further use the similarity between the growth test and step-down stress accelerated life test to evaluate the reliability of the step-down stress ALT using the Amsaa model. The Amsaa model overcomes the difficulties of choosing from multiple the accelerated models of step-down stress. Finally, the simulation results verify the feasibility if the method.

Overall Handling Equipment Efficiency and Maintenance Systems

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The maintenance of handling equipment is an area with a huge potential for increasing availability and reliability and to reduce costs and losses. Several maintenance approaches and systems have been developed, such as reactive, proactive or aggressive systems, etc. However the validity of these systems could be question able if is used while collecting wrong data, e.g. using OEE index for handling equipment. Therefore it is necessary to establish a versatile methodology which can serve as a consistent tool for evaluating their efficiency and which provides us information about the state of handling equipment. This paper proposes a consistent tool for evaluating the efficiency of handling equipment and joins together maintenance approaches and systems. There is also shown a comparison of the most common maintenance approaches for handling equipment.

Maintainability Management of Production Facilities in Complex and Challenging Operating Conditions

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As products become more complex, failures and faults become harder and more time-consuming to repair. Maintainability engendering aim is to facilitate the repair process. Maintainability is a design characteristic that affects accuracy, ease, and time requirements of maintenance actions. The effective practice of maintainability design and engineering requires a systematic management approach. This paper is developed a systematic guideline for maintainability management as engineering discipline for challenges operational condition.

Anisotropic Coupling Damage Model for Reliability Life Assessment

Peng Lai, Weiwei Hu, Yufeng Sun
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An isotropic continuum damage mechanics (CDM) framework, which is developed in this paper, can provide sufficient theory of interaction mechanism of multi-damage such as brittle damage, ductile damage and creep damage. Principle of linear superposition of these different types of damage applying in engineering, which considered that these damage are independent, is not always accurate. A new creep-fatigue model which can help reliability life assessment is proposed in this paper, considering the coupling effect of fatigue damage and creep damage based on CDM.

A Novel Multi-Class Fault Diagnosis Approach Based on Support Vector Machine of Particle Swarm Optimization and Huffman Tree

Fan Wu, Weiwei Hu, Yufeng Sun
Beihang University, China

Based on VC dimension theory and structural risk minimization principle of statistical learning theory, Support vector machine (SVM) has a prominent advantage in solving classification and fault prediction problems, specifically suitable for small sample, nonlinear and high dimensional pattern recognition problems. However, SVM is originally created for solving binary classification problems. The efficient application of SVM on multi-classification has always been a hotspot. This paper represents a novel approach to the multi-class fault diagnosis based on support vector machine of particle swarm optimization method. Besides the one-against-one, one-against-other, directed acyclic graph and binary tree, the Huffman tree is introduced, and the priority of the classification is determined by calculating dissimilarity degree of each two class. Thus, a multi-classification model based on Huffman tree is built. When the sample amount of each class varies greatly, using the same penalty parameter for each class will lower the classification accuracy. Thus, the penalty parameters of different class is optimized by particle swarm optimization method, which guarantee each SVM is the optimal result. Finally, a database of power transformer is used to demonstrate the superiority of this new method.

A Data-Driven Method for Life Prediction Based on Performance Degradation Data Under Complicated Stress

Jieru Meng, Jing Feng, Tianyu Liu, Quan Sun, Zhengqiang Pan
National University of Defense Technology, China

This paper presents a novel life prediction approach for degraded components under complicated stress. The approach mainly consists of two parts: a data discretization method for computing degradation rates and a clustering analysis rule to divide the complicated stress into several categories. An empirical model is built to describe the relationship between the center of stress and the degradation rate. Finally, life prediction under any given stress level can be conducted based on the empirical model. The data-driven method in this paper can avoid the difficulty of degradation modeling under complicated stress profiles. The effectiveness of the proposed method is demonstrated by a case study.

An Overview of Application of E-Maintenance for Arctic Production Facilities

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An industry with a high level of investment, such as Arctic offshore oil and gas, the costs of the production losses due to a long downtime are substantial which can affect business performance. Thus the selection of the maintenance policy for the Arctic is one of the most important decisions of strategic maintenance management. It guarantees not only adequate control of the maintenance costs but also competitive performances of the production system in terms of safety, availability and quality. Development of the communication and information technologies provides the opportunity for a new maintenance generation named e-maintenance. E-maintenance for the Arctic with high demand for efficient maintenance, remote maintenance, real-time information access and condition monitoring can be as a solution. This paper presents the opportunities and challenges with e-maintenance in the Arctic.

Integrated Model for Analyzing Industrial Energy Potential

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It is a commonplace that integrated models work better in various analyses to force the quantification of intended variables in energy phenomenon and dynamics. This study presents a developed integrated index decomposition analyses (IDA), artificial neural network (ANN) and data envelopment analyses (DEA) to assist in the quantification of possible energy potentials in the industrial sector. Activity, structure and intensity variables are used as inputs to the developed integrated model. Comparison of results in various applications of the model is presented.

Modeling and Forecasting Product Returns: An Industry Case Study

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The paper presents an industry case study on modeling and forecasting product returns in remanufacturing industry. Based on return patterns of 36 products over 20 months, Holt's and ARIMA methods are identified as the appropriate methods to forecast the future returns of 36 products. To decide which method is more accurate for forecasting the future return of each product, we use MAE, MAPE, and RMSE to evaluate the forecasting accuracy. The accurate method is recommended for forecasting each product.

A Heuristic Algorithm for the Load-Dependent Capacitated Vehicle Routing Problem with Time Windows

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In this paper we introduce an extension of the vehicle routing problem with time windows (VRPTW) called the Load-dependent Capacitated Vehicle Routing Problem with Time Windows (LDVRPTW). This problem differs from the classical VRP and VRPTW on the transportation costs, which are calculated not only on the travel distance, but also the loads on the arcs. We propose a metaheuristic to address this LDVRPTW problem. The proposed algorithm is tested on benchmark instances on special case problems of LDVRPTW. Numerical results show that the on some LDVRPTW variants our metaheuristic outperforms the available state-of-the-art exact and heuristic methods.

Offline Time-Sensitive Travel Time Estimation in an Urban Road Network

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In line with the advent of the Knowledge Age, logistic companies are harnessing the power of knowledge derivation from raw data to perform Just-In-Time (JIT) delivery. However, the uncertainty involved in estimation of future travel time and a lack of benchmarks designed with travel time as primary cost in mind hamper development towards an optimal logistics planning system. To this end, a modified Dijkstra's algorithm for time sensitive offline travel time estimation between two locations connected by an urban road network is introduced. An analysis of the absolute errors of estimation results shows that the proposed algorithm is satisfyingly accurate for the purposes of benchmark design and logistics route planning.

Multi-Objective Embarrassingly Parallel Search for Constraint Programming

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Optimization plays an important role in various disciplines of engineering. Multi-objective optimization is usually characterized by a Pareto front. In large scale multi- objective optimization problems, determining an optimal Pareto front consumes large time. Thus, parallel computing is used to speed up the search. Constraint programming is one of the logic-based optimization techniques for solving combinatorial optimization problems. Kotecha et al. proposed a constraint programming-based strategy to determine an optimal Pareto front. Regin et al. proposed a parallel search for constraint programming, called the embarrassingly parallel search. In this paper, we propose the multi-objective embarrassingly parallel search for multi-objective constraint optimization, which combines the two strategies.

Application of Heuristic Algorithms on Groundwater Pumping Source Identification Problems

Jin-Long Wang, Yu-Hao Lin, Min-Der Lin
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This study investigates the application of heuristic algorithms on groundwater pumping source identification problem. Unknown groundwater extraction site is located by analyzing the hydraulic heads of the observation wells. Genetic algorithm (GA), particle swarm optimization (PSO), mutated PSO (MUPSO), their hybrid models GA-MUPSO, and groundwater simulation models are employed to solve the problems afore mentioned. The results indicate that all optimization models developed here can successfully locate the pumping source. Especially the GA-MUPSO hybrid model illustrated the best performance and efficiency, not only located the pumping source with a 100% success rate, but also required a far less CPU time than GA and PSO.

Survey on Applications of Biased-Random Key Genetic Algorithms for Solving Optimization Problems

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This paper presents a survey on studies devising biased-random key genetic algorithms (BRKGAs), a novel variant of the ordinary genetic algorithms (GAs) introduced in 2000s, for solving numerous optimization problems up to 2015. The aim is to provide a comprehensive picture of the development of the algorithms and the areas of implementation in literature yet. From the survey, a number of findings include: (1) number of studies tends to increase over the last five years dealing with various combinatorial optimization problems, however limited research deals with continuous variables, (2) local search procedure is the typical hybridization method used to enhance the performance of the algorithms, hence others improvement methods are still potential avenues for future research.

Importance Measurement of Performance Shaping Factors using Dynamic Reliability Indices

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The component dynamic reliability index (CDRI) for the multi-state system is transplanted to human reliability domain, and used to evaluate the importance of performance shaping factors (PSF). The concepts about PSFs and CDRI are overviewed firstly. The importance of some PSF, namely, CDRI is the probability of human error probability (HEP) changing from one level to another level caused by the PSF's state shifting. In basic version of CREAM, HEP is predefined as four intervals. So the CDRI is the probability of HEP increasing from lower interval to upper interval caused by the degradation of common performance conditions (CPCs). It is concluded that 3-level CPC has higher CDRI than 2-level CPC does. In SPAR-H, the continuous HEP is classified as high value, medium value and low value intervals first of all. The CDRI of some PSF is the probability of HEP decreasing from high value to medium or low value because of the improvement of the PSF state. It is found that the PSFs, such as Available time, Fitness for duty, Ergonomics/HMI and Procedures with much higher or smaller multiplier may have greater CDRI. The more importance one PSF is, the more emphasis should be given. With the help of the conclusion, the risk caused by human error in nuclear power plant, space task or other risk-critical domains can be reduced more effectively.

Effect of Different Presentation Orders on Processing Time and Time Estimation of Verbal Working Memory

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This research explored the effect of different presentation orders on processing time and time estimation, from the perspective of verbal working memory dual-task mode task. 108 participants took part in memorizing order or disorder French word, it showed that the presentation order significantly shortens the processing time and estimation time, thus it proved that the orderly presentation can enhance the work efficiency compared with the disorderly presentation. This research highlights the impact of presentation upon the verbal working memory, which had important theoretical and practical implications.

Relationship Between Characteristics of Human Factors Based on Marine Accident Analysis

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Most marine engine accidents are caused by human errors, such as misperception, misjudgment and misoperation. It is essential to comprehensively analyze human errors occurred during marine engine plant operation, and to investigate more effective measures to prevent the similar errors. The Engine-room Resource Management training has become more important for marine engineers working in a complex system. In this paper, first, characteristics of total human errors are investigated by taking 298 marine accidents records from Japan Marine Accident Inquiry. Second, the latent factors which are common factors in accident records are determined using covariance structure analysis. Moreover, the relationships between latent factors and onshore management personnel were investigated using System Dynamics. In this work, a basic model for effective education and support method which improve the marine engineers' skills is considered.

A Bibliometric Analysis of Project Management Research

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Our study employs quantitative bibliometric techniques including citation and co-citation analysis through social network realisation and Gephi clustering of articles from the Project Management Journal published by Project Management Institute (PMI). We identified the core themes to be Project Success/Failure, Portfolio/Programme Management, Knowledge Management, Qualitative Research, Complex Projects, Project Leadership and Best Practice. Our analysis shows that the majority of the literature is still academic in nature, and there is room for researchers to conduct future studies that is of more practiced-based relevant. However, the topics we discern suggest the start of divergence away from the PMI BoK (PMBOK) and researchers are developing tools which manage the specific issues in this information's age.

An Analysis on Affective Expression in Articles of Popular Science by Text Mining

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This paper aims to analyze affective expressions in articles of popular science by text mining with the keywords "Cancer" and "Immunity". This study selects 145 articles from the website of a magazine and segmented them into 410,919 terms. And the study uses an automatic system to classify the terms into vocabulary categories, selecting the affective terms with specific vocabulary categories. The results show those the affective terms in the analyzed articles of popular science are not significantly differential with year and decade. But there is a significantly negative correlation with the quantity of articles that are published in the same year. That is, the more articles are published the less proportion of affective terms to the summary terms occurs on the articles.

A New Applicable Knowledge Management Model to Develop Innovativeness in a Small and Medium-Sized Enterprise Research and Development Center

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In this paper, a new applicable knowledge management model is introduced. The intended model is obtained through analyzing the achieved results in a research developing center to expand the innovativeness and knowledge creation, sharing and distributing process among the employees from a small and medium-sized enterprise research and development center (SME R&D center) as a case study. There are three main themes to be identified based on the analyzed and achieved results. These themes are classified based on the gathered information. In fact, these themes are the Nodes, based on which achieved codes are categorized and organized.

Global Patent Analysis of Power Lithium-Ion Battery Separator

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The development of technologies related to power lithium-ion battery separator has been taken place in recent years. In order to provide appropriate decision references for the industry development, patent analysis was carried out. On the basis of Derwent Innovation Index (DII), global patents related to power lithium-ion battery separator were analyzed from aspects of global development scale and trend, technology fields, geographic distribution, top assignees. The findings show that power lithium-ion battery separator industry has entered fast-growth stage. In branch technology fields, raw materials are the priority research and development (R&D) areas of power lithium-ion battery separator. Japan has applied for a large number of patents and occupied the leading position. Asahi Kasei Chemicals Corporation, Toray industries, Tonen Chemical Corporation possess strategic advantages over other enterprises in the current competitive situation of international separator market.

R&D Performance Measurement: A Process Perspective Revisited

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When assessing Research and development (R&D) activity on organizational level, it is extremely important to select the most suitable and accurate indicators for a valid evaluation of activity efficiency, productivity or effectiveness. It is the case that R&D activity differs from a regular activity of a business company by the nature and value of the output as well as the specificity of the R&D process itself. That is why its measurement requires the special attention. This paper presents the constructed comprehensive framework of R&D performance measurement at organizational level. It has been modelled using a base of R&D key processes chain: Input – In-Process – Output – Transfer system – Outcome. Such platform designed to present R&D activity indicators is considered as the most effective way to group the measures, as it can combine all the other measurement perspectives, such as financial, innovativeness and others.

The Investigation of Semiconductor Shipping Bag Reliability

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The shipping bag used in semiconductor industry is very important as a protection guard of products. It provides good protection for finished products after shipping and the handling by the final users. Among various shipping bags, Moisture Barrier Bag (MBB) is the most widely used type in the semiconductor industry because of its high reliability. However, with the technology advancement, the packing of a large size of IC wafers is inevitable, which brings a new challenge to its resistance to a greater load of shipping and dropping. To reduce the failure rate of MBB leakage during shipment, we evaluate the physical and tensile strength of the shipping bag composed of different films. We significantly improved MBB by optimizing its raw material, which is the first time such approach with plausible results is reported.

Study on Inline OVL Control Method

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In this paper, we study on Overlay (OVL) control method for inline OVL measurement. In semi conduct manufacturing industry, Lithography (Litho) OVL is defined as the positional accuracy, a criteria parameter and to detect possible inline nonconformance from recipe and equipment shifts [1]. Generally, most control limit setting are based on the engineering judgment, tolerance about 1/3 critical dimension, and no statistical control assurance.

The goal of this work is to find a statistic method for inline OVL chart control limit setting, by setting up a reasonable control of OVL chart, a new control method of OVL chart is defined. It is based on a study of the statistic method "t-distribution & chi-squared distribution". Through studying on Inline OVL mean data and standard deviation data, we found these data are offside data, and does not follow normal distribution. Control charts of these data don't suit be controlled by n*sigma, we study and promote to use t-distribution and chi-squared distribution to control OVL chart. Then we calculate the new control limit with this method, which can provide reasonable control limit and OCAP ratio, thus control OVL process effectively.

Advanced Quality Control at Raw Material Kickoff Stage

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The quality requirement for raw material is becoming more and stricter along with technical development of semiconductor industry. To meet the high technical requirement, effective quality control at raw material kickoff stage can remarkably reduce quality risk during manufacturing process. This paper will focus on the application of advanced quality control at raw material kickoff stage. The purpose is to reduce manufacturing risk by implementing the advanced quality control methodology at raw material kickoff stage and strictly following the defined requirements during mass production at both supplier plant and foundry.

Wafer Level Package Wafer Probing Shift Error-Proof Quality Control

Morn Jin, Wenwen He, John Qiao, Wei-Ting Kary Chien, Shirley Zhao
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Wafer level package (WLP) is one of the fastest growing segments in the semiconductor packaging industries. Low costs, small sizes, and the ease of logistics make WLP a main-stream packaging solution for a single chip. However, different from conventional packages, WLP has no final test (FT) and only relies on wafer level probing for functional test, which may induce the trouble that once wafer probing map shifts, the functionally failed dice will be shipped as good ones and result in huge economic compensations. In such situation, based on manufacturing experiences and actual experimental data, this paper provided preventive guidelines and detecting solutions to eliminate the impact from wafer probing shifts.

Monitoring the Frequency and Magnitude of an Event with a Ratio Chart

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Control charts for monitoring the event has attracted many researchers' interests and many works have been done in recent years. However, previous works always neglect the dependence between event frequency and event magnitude and this kind of ignorance may make the control chart not suitable in some real applications. In our work, the frequency and magnitude of an event is characterized by a bivariate gamma distribution with a dependence parameter. And the ratio of the event magnitude and event frequency is introduced and the EWMA type of the ratio is considered as the monitoring statistic. The implementation procedure of the introduced chart is discussed with an example.

Performance Gains with the Quality, Health, Safety and Environment (QHSE) Management in Works of Retrofit

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The recycling of materials is increasingly being used by the manufacturing industry. It is an attitude in response the growing charges that society has imposed the producer market. In the construction industry this demand is even more intense due to the large volumes of raw materials consumed for the execution of new buildings, the generation of waste during the construction process and finally the generation of wastes at the end of the useful life of the building. In this regard the adoption of the retrofit in buildings as a way to adapt them to new uses and thus prolong their life has grown considerably in the construction market. The implementation of the retrofit in buildings requires the use of specialized teams, adequately trained and modern construction techniques with emphasis on the highest possible utilization of materials already available in the building retrofit of the object. In this sense this work presents the implementation of the integrated quality management methodology, safety, environment and health in construction of buildings retrofit as a tool to achieve gains in performance in recycling the use of buildings.

Hydrostatic Transmission System Failure Analysis and Utilization of Failure Knowledge: A Case Study

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The hydrostatic transmission system is widely used in heavy industrial equipment for energy or power transmission. A systematic failure analysis of the hydrostatic system is presented in this work, which maps failure mechanisms and root causes of failures into appropriate physics of failure models. Finally, the usefulness of knowledge generated through failure analysis process is recommended in improving product design and other operations such as, warranty and maintenance management.

A Model for Degradation Prediction with Change Point Based on Wiener Process

Xiaojie Ke, Zhengguo Xu
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Prediction of degradation paths is important to condition-based maintenance (CBM). To address the detection of the existence of a sudden change point in a degradation path, a piecewise model based on Wiener process with a linear drift is proposed. Two different degradation drifts are introduced in the model as hidden states. Based on the Bayesian theorem, the likelihood function is given and the algorithm of parameter estimation is presented subsequently. Meanwhile, the Kalman filter and the smoother algorithm are used to estimate the hidden states. And we detect the change point of the two-stage degradation according to the concordance correlation coefficient. To validate the proposed method, a numerical simulation and a case study of bearing are presented at last.

Double Response Surface Method of Reliability Analysis for Mechanism

Chun-Yi Zhang, Jing-Ya Liu, Cheng Lu, Bao-Sheng Liu, Ai-Hua Wang, Ming-You Bai
Harbin University of Science & Technology, China

A new method for analyzing the reliability of mechanism is proposed. The proposed method suggests the use of two response surface functions to evaluate the reliability probability. Structural reliability can be calculated through the analysis of the maximum stress and the maximum deformation of crank-rocker mechanism to establish its limit states equations respectively and then ganged sample these response surfaces that is double response surface, structural reliability can be calculated. Aiming at analyzing reliability of mechanical system with multiple components which have multiple failure modes, this method can realize the whole reliability analysis under the consideration of the correlation of these failure modes. The example result indicates that calculation velocity of this method is high; precision of this method is exact. It can be used in other researches and projects.

A Design Method for Force-Limited Vibration Testing Conditions

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This paper proposed a design method for force-limited vibration testing conditions based on the complex two degrees of freedom system (TDFS) model. This method adopted the dynamic sub-structure theory to calculate the modal effective mass and the residual mass of the test article structure and the supporting structure, determined the specific parameters of the complex TDFS model in different bands depending on their distributions. The force spectrum and the acceleration spectrum of the contact surface between test article and supporting structure were defined with the excitation conditions of supporting structure. On the basis of the envelope, the force limited vibration test profile was obtained. Simulation results showed that the force-limited vibration testing conditions given by this method reflect the vibration environment of the test article much more realistically compared to the conservative testing conditions of the traditional acceleration-controlled vibration test.

Strategy for Reliability Testing and Evaluation of Cyber Physical Systems

Zi Li, Rui Kang
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Internal and external factors that influence reliability of CPSs are analyzed in this paper. A strategy for reliability testing and evaluation of CPSs is put forward in the consideration of these factors, including the technology framework and processes. The main work comprises the testing and evaluation of component reliability covering hardware, software, and architecture, as well as the performance reliability including service reliability, cyber security reliability, resilience & elasticity reliability and vulnerability reliability. To give a general look of the system reliability, the four indices of performance reliability are synthesized by the multi-index method. The strategy proposed in the paper will make a great contribution to the complete, dynamic and continuous testing and evaluation for the CPS.

Integrated Model of Production Plan and Preventive Maintenance Based on a Game-Theoretic Framework

Jiawen Hu, Zuhua Jiang
Shanghai Jiao Tong University, China

A joint model for integrating preventive maintenance (PM) with the capacitated lot sizing problem (CLSP) based on a game-theoretic framework has been proposed. Assume the production rate varies from period to period according to total lot size of each production period (PP). An imperfect PM model is established for system running with dynamic production rate, which is performed at scheduled times, and minimal repair (MR) is adopted to restore the system to work without altering hazard rate when failure happens. Considering availability reduction caused by maintenance and effect of production rate on hazard rate function of system, a Stackelberg game theory model is adopted to handle the interactive effect between production plan and PM schedule. The optimal production rate of each PP and PM sequences are obtained simultaneously. An example is studied to validate the model, also the results are discussed.

A New Reliability Assessment Model for Power Electronic Modules

Xing Zhuang, Om Prakash Yadav
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The reliability of power electronic modules is investigated in a series system configuration. The impact of the increased junction temperature, caused by initiation of degradation process, is studied and captured to assess the effect on other component degradation processes: wire bond lift-off and the chip solder joint delamination.   The proposed reliability model combines physics of failure modeling and probabilistic modeling to demonstrate the degradation processes affecting power electronic module lifetime. The effectiveness of the proposed model is further demonstrated by a numerical example.

A Simulation-Based Method for EMR Assessment of Aviation Electronic Products

Zenghui Yuan, Ying Chen, Lei Gao
Beihang University, China

With the application and development of electronic devices, the electromagnetic energy in our surrounding space is gaining rapidly. Especially for those aviation electronic products in the limited space, their characters, such as variety, high density, sensitivity and power, make them susceptible to electromagnetic interference. Traditional electromagnetic compliance (EMC) analysis focuses on EMC design, targeting passing the EMC tests. There are few researches on EMC reliability or even the reliability index. Concerning this issue, this paper puts forward to a complete theory to assess the electromagnetic reliability (EMR) of the aviation electronic product. It combines stress-strength interference (SSI) model, probabilistic physics of failure (PPoF) method and simulation analysis, which provides theory support to solve the EMC problems and improve its reliability.

Tolerance Limits for Gamma Distribution Based on Generalized Fiducial Method

Piao Chen, Zhi-Sheng Ye
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This study proposes methods for constructing tolerance limits for the gamma distribution. The gamma distribution is found to be useful in many areas and the tolerance limits are often desirable in some monitoring and control problems. Existing inference methods either assume some parameters known or does not work well for one-sided tolerance limit case. In this study, the generalized fiducial method is used for constructing the tolerance limits for the gamma distribution. The proposed methods are assessed by a simulation study. An illustrative example demonstrates the inference methods.

Passenger Perceptions on Reliability of an Inter-Campus Bus System

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Passenger perceptions about reliability are influenced by a number of factors. These factors include average lateness, excess wait time, and buses arriving on time, buses cancelled and buses departing on time. Literature, informs us that passengers have different perceptions about lateness, excess wait time, and buses arriving and departing on time and cancelled buses. Over 60 % of employed South Africans rely on public transport. The research question is, what are the important reliability indicators are for passengers of a University transport system? Extensive research has been done in the areas of transport reliability, but not in the field of transport designated for students. Engineered systems may fail, especially in passenger transport if the perceived value is not experienced by passengers. Among other findings, is that passengers place a great value on the bus schedule times and how those are communicated.

Reliability Model of the Railway Transportation System With Respect to Hazard States

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In this paper, the authors' research work is focused on modeling of railway transportation system's reliability and safety with respect to hazards. The paper begins with an introduction related to a literature review on railway transportation system reliability and safety modeling. A state-transition model was proposed. Defining states in terms of railway transportation system is a complex issue, therefore the state classification into availability and failure is not sufficient. In addition to the technical effects associated with incorrect operation of system components, traffic consequences (traffic disruptions) of events are important, especially in case of railway transportation system. The Markov model was built is described in relation to the parameters above. The paper ends with validation of the model, conclusions of the analysis, dealing with applicability of the model to solve problems for the real system and a summary with prospects for further research.

Study on Reliability Assessment Method for Step-Down-Stress Accelerated Life Test Based on Bayesian Theory

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An assessment method for Step-down-stress accelerated life test data based on Bayesian theory is proposed in this paper. For the problem of the limited test information gained in the small sample life test, the assessment result is may not accurate enough. In this paper, we assume a certain prior distribution, according to prior information. Then, establish the posterior distribution combined with the accelerate life test data. Finally calculate the parameters of the accelerated model and life distribution. The simulation case of extreme small sample test verifies the effectiveness of the proposed approach.

An Investigation on Imperialist Competitive Algorithm for Solving Reliability-Redundancy Allocation Problems

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Reliability-redundancy allocation problems (RRAPs) are optimization models that try to find the optimal number of redundant components and their reliability levels simultaneously. Many studies have been developed to solve RRAPs in recent years. There are some specific RRAP models for various system structures to maximize system reliability subject to cost, volume and weight constraints. Different meta-heuristic algorithms have been used in order to reach the best objective function value. In this study, an investigation is done on imperialist competitive algorithm (ICA) to maximize models for series and bridge systems. ICA is used by adjusting different values to algorithm's parameters. This investigation recognizes which combination is the most suitable for solving the RRAPs by ICA. Each combination has been run for 35 times. Therefore, the combinations are compared by descriptive statistics' measures and analysis of variance (ANOVA). Furthermore, the best obtained solution is compared with the previous studies.

Bayesian Analysis for NHPP-Based Software Fault Detection and Correction Processes

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Many software reliability methods have been proposed for estimating and predicting reliability, and the method based on Bayesian framework is a popular one. However, the present Bayesian approaches are all based on the impractical assumption that the detected faults are corrected immediately with no debugging time delay. In this paper, we derive effective parameter estimation algorithms based on Bayesian framework not only for fault detection process, but also for combined detection and correction processes. To have a better understanding of the estimation performance, a simulation study and a practical example are conducted to investigate the performance of the proposed Bayesian approach.

Optimal Maintenance Service Contract Involving Discrete Preventive Maintenance Using Principal Agent Theory

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Maintenance subcontracting has been widely implemented. The owner of equipment hires an agent to perform maintenance actions with a predetermined availability target to be met. The traditional payment scheme such as a fixed price, a cost reimbursement is effective only to ensure the achievement of the availability target. However, there are circumstances where pushing the agent to exceed the target will be rewarding, especially in high operational revenue such as in mining industry. To get this reward, a new payment scheme is needed. This research aims to study maintenance contract payment schemes that would motivate an agent to achieve a higher performance which is beyond the target. A principal agent theory is used as it allows to model the owner's and the agent's decision making process simultaneously.

Marine Activities in the Arctic: The Need for Implementation of a "Buddy System"

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Because of the large distances, low temperatures and unpredictable weather in the Arctic, the existing search and rescue (SAR) resources will not be sufficient in certain situations and large loss of lives are at risk. Moreover, it is impossible to raise the SAR capacity of the entire region to an acceptable level, and therefore it might be beneficial to think outside the box. This paper wants to investigate the possibility for implementation of a "buddy system", a system where two or more units work in parallel to support each other in case of emergency, under Arctic conditions as a buffer during an unwanted situation in order to buy time for sufficient SAR resources to come to aid. Two case studies are investigated: The fate of a sinking cruise liner and the support to an offshore rig drilling for oil and gas in arctic conditions. In both situations, a buddy system will improve the possibility to rescue people in an emergency.

Performance-based Aggregation of Expert Opinions for Reliability Prediction of Arctic Offshore Facilities

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One of the major challenges in reliability assessment of the Arctic oil and gas facilities is lack of adequate life data. In order to use the available life data obtained in normal climate regions, some modifications are required to include the ad-verse effects of Arctic operating conditions on equipment reliability performance. In this study, a methodology, based on expert judgement concept, is presented to modify the available mean time to failure (MTTF) data and thus to use for the reliability assessment of Arctic oil and gas facilities. For this purpose, expert opinions on the potential amount of decrease in MTTF of a set of components are elicited. Such opinions are further aggregated using arithmetic averaging rules. A performance-based method is used to assign a weight for each expert based on his/her opinion on some calibration questions. A case study illustrates the proposed methodology.

Optimal Preventive Maintenance for a Fleet of Dump Trucks with Two-Dimensional Lease Contract

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This paper develops a mathematical model of optimal fleet number of lease product. The lease coverage is characterized by two parameters – age and usage. We use one dimensional approach to model the age and usage of a repairable equipment. The lessor will give preventive maintenance, and a penalty cost incurred when the time required to perform an imperfect repair exceeds a target. This strategy will reduce equipment failures and hence decreasing the penalty cost and maintenance cost during the leased contract. We find the optimal maintenance degree and time between preventive maintenance such that the expected total cost is minimized.

Virtual Try-On of Footwear in Augmented Reality Using RGB-D Cameras

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This paper presents a novel system for personalized design of footwear using commercial depth-sensing technologies. The system allows users to virtually try on 3D shoe models in a live video stream. A two-stage object tracking algorithm was developed to correctly align shoe models to moving feet during the try-on process. Tracking was driven by an iterative closest point (ICP) algorithm that superimposed the captured depth data and predefined reference foot models. Test data showed that the two-stage approach produced increased positional accuracy compared with tracking using only surface registration. Trimming the reference model using the instant view angle improved the computational efficiency of the ICP algorithm. The developed virtual try-on function is an effective tool for realizing human-centered design. This study also showed a new application of RGB-D Cameras to product design.

Hand Anthropometry of Czech Population

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This paper presents results of hand anthropometric study performed on 586 males and 446 females of different age groups of Czech Republic population. Eight dimensions on each hand were measured together with body height and weight. The mean, standard deviation and 5th, 50th and 95th percentile values are summarized and tabulated in the paper. Comments on differences between genders, right and left hand, age groups and others are given. The purpose of the study was to obtain enough data for efficient hand tool design or to be able to determine the dimensions required for openings for hand access into machinery as there is a lack of those information for Czech population. Also a comparison with anthropometry data of other world populations was performed to evaluate potential differences.

Evaluation of Subjective Fatigue Tool – A Study Addressing Restaurant Employees in Indonesia

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Fatigue is a complex phenomenon, which may interfere productivity in many occupational settings. Nowadays, restaurant industry does not only offer good food, but also a pleasant experience and hospitality. To assess how restaurants employees in Indonesia perceived fatigue related to their job, assessment conducted using Swedish Occupational Fatigue Index (SOFI) in Indonesian language. The study involved 180 employees from 9 casual dining restaurants. Translated SOFI has good reliability and validity test result based on Cronbach Alpha value and internal consistency coefficient. Using F-test, the null hypothesis is rejected, and it can be concluded that the fatigue level of each dimension and employees from each restaurant is different. The greatest level of fatigue experienced by employees from restaurant ninth and employees from restaurant first is the lowest. Level of fatigue was acceptable (light to moderate), as indicated by the average value for most dimensions (less than 3.5 on scale of 1-7).

Analysis of Performance Assessment for Teachers of Independent Colleges in China

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The quality of teaching performance is a primary index for the assessment of high-grade education in China and/or in other countries of the world. As a new type of high-grade educational institutions in China, independent colleges have been confronting many difficulties and blocks in practice, which greatly affects the teaching quality of the independent colleges. By analyzing the teaching-evaluation process of our college in recent years, the author pointed out the existing deficiencies in the performance assessment for independent college teachers and suggested countermeasures to the problems.

Oculomotor Response in Measuring Driving Fatigue

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Fatigue is a major factor that affects road safety. In Indonesia, the number of accidents seems to increase every year. Unfortunately, research that focuses on fatigue while driving is still limited. This study focuses on discussing oculomotor responses in measuring fatigue associated with driving. Experimental design used in this research, consisted of various factors of fatigue based on literature, and measured several indicators of oculomotor response. The experimental design in this research was modeled according to the real working condition of commercial drivers in Indonesia, with fairly long working hours (15-16 hours/day). The benefit of this study is to develop a valid method for detecting fatigue based on oculomotor response. It is expected that the finding can help to minimize the level of accident in Indonesia. In conclusion, there is still disagreement from literature on good oculomotor response for measuring fatigue, which warrants further investigations such as the present study.

A Study on Affective Feeling Evaluation for Automotive Wiper Switch Based on Multiple Regression Model

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Recently, newly launched vehicles have been more luxurious than past cars. Also, these cars will be simultaneously satisfied between functional operation and aspect of affective feelings. Accordingly, when developing auto parts, many suppliers should consider between functional operation and affectiveness for drivers. Affective engineering in nowadays is studied to evaluate driver's affective feeling by parts suppliers. Regarding automotive business trends, emotional feeling studies have been increasing. This study's aim is to analyze operational feeling for wiper switch in automotive combination switch module. According to this study, it's possible to attract design variables to improve feeling based on various factors. Consequently, it's available to confirm feeling improvement through the statistic analysis based on significance probability and measured data of 15 samples. From now on, result of this study will be applied for development of more satisfiable switch after considering evaluation and factors for consumers.

Development of a Rule Base and Algorithm for a Quotation Preparation Process: A Case Study with a VSM Approach

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Quotation preparation lead time plays a significant role in the aircraft components manufacturing (ACM) industry. This is especially due to the fact that on each occasion the sub-contracting suppliers have to manufacture component(s) of which they have no previous experience based on the external demand. The quotation preparation takes place between different actors once the request for a manufacturing proposal has been met. Also, a particular ACM organization investigates the potential capabilities of the selected sub-contracting manufacturers and their suppliers. The sub-contracting manufacturers have to select sub-suppliers to purchase necessary semi-finished goods and raw material to meet the anticipated quality requirements posed by the ACM organization. The waste in terms of time is significantly high due to the possible delays in data and information flow during the quotation preparation process (QPP). The time wastages are mainly caused by the delays within the same manufacturing organization between different functional units (i.e. internal time wastages) as well as between suppliers and the client (i.e. external time wastages). This manuscript suggests an approach with the help of tailor-made value stream mapping (VSM) to investigate the challenges and mitigate the delays caused during the QPP.

Resolution of Deadlocks in a Robotic Cell Scheduling Problem with Post-Process Inspection System: Avoidance and Recovery Scenarios

Mehdi Foumani[1], Indra Gunawan[2], Kate Smith-Miles[1]
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The phenomenon of deadlock in robotic cells has been long ignored by most scheduling literature. A deadlock situation arises if a part cannot change its current state indefinitely since the destination machine is occupied by another part. The probability of the deadlock occurrence is likely to be large when the processing route cannot be predicted with certainty due to inspection processes. Our focus here is on a specific robotic cell with a post-process inspection system where the inspection is performed on an independent inspection machine. Avoidance and recovery policies are applied to overcome deadlocks originated from this cell. We develop these policies to prevent deadlock or alternatively resolve it during the online implementation of cycles. The former policy minimizes the storage cost, whereas the later policy minimizes the expected cycle time. An analysis of the scheduling problem that involves timings and costs is also carried out for comparing policies.

Potential for Improving Performance through Design for Environment (DFE) in a Ferrous Foundry

Ignatio Madanhire, Charles Mbohwa
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The study dwelled on how to develop an implementation procedure for design for environment (DFE) management program. A ferrous foundry manufacturing organization was the subject of comprehensive assessment and recommendations in this research. The main thrust of this work was to develop theory on how DFE could be comprehensively and consistently managed in daily business situation of product development. The use of DFE for foundry industry would go a long way in preserving the environment and improving plant performance.

Reducing Variability in Micro-Milling Process Using Six Sigma Methodology

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Micro-milling is a manufacturing process used as an alternative for the fabrication of Lab-on-a-Chip components among other medical applications. In the work presented here, the six sigma methodology was used for evaluating micro-milling process parameters and their impact on the generation of geometrical errors such as tool wear, vibrations and burr formations. These critical variables affect surface quality and geometrical features for Lab-On-a-Chip microfluidic performance. This paper presents the application of DMAIC (Define, Measure, Analyze, Improve and Control) methodology in micro-milling process in order to study cutting parameters and their influence on surface quality. Finally, improvements are implemented to enhance process capability as related to surface roughness.

Remote Supervision of Production Processes in the Food Industry

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This paper presents a remote monitoring system based on the SCADA model (Supervisory Control And Data Acquisition), specifically developed for automated production processes in a food company.
The goals defined for this project were the monitoring of three production lines and six silos of raw materials, along with the indication / evaluation of three performance measures demanded by the company: production rate, packed quantity and OEE (Overall Equipment Effectiveness). The developed system should also include other typical SCADA functionalities, namely alarms management, process trending and data logging. The applied methodology involved the detailed analysis of the existing automation systems, the functional specification of the remote monitoring system and the corresponding implementation (using the LabVIEW platform), test and validation. The project took about six months and the system was successfully implemented in one of the company's factories. All the objectives were achieved.

Redesign of the Production System: A Hard Decision-Making Process

Anabela Alves, Rui Sousa, J. Dinis Carvalho
University of Minho, Portugal

Lean production is an organizational methodology that has been successfully adopted by many companies, of goods and services, aiming to improve their performance. Nevertheless, the implementation of lean involves challenges and problems that many companies are not prepared for. The main challenge is the need for a cultural change (mindset). A very common problem is the decision-making process on the need to redefine the production system. In fact, the production systems of many companies are obsolete and therefore not suited to the current market needs, but, even though, the decision-making process is not easy.
This paper presents and analyzes eight industrial projects involving the redesign of production systems, providing a discussion on the main enablers and inhibitors of the referred decision-making process. Each project was developed by a student, in the ambit of his/her Master Thesis on Industrial Engineering and Management, under supervision of one of the authors.

Accessing Bank Finance in Relation to Human Capital, Gender and Race Among SMMEs in a Developing Economy

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Small, Micro and Medium-sized Enterprises (SMMEs) contribute to the national economy significantly. However, many SMMEs have difficulties in accessing bank finance due to the lower level of their human capital and scarce financial resources in the context of developing economies. This study aims to investigate the key factors of human capital and associated issues with access to bank finance from gender and race perspectives. A survey design combined qualitative and quantitative research approaches were employed in this study. Data were collected through a self-administered questionnaire and a number of interviews. A group of SMME owners (n=532) were randomly selected from the Western Cape, South Africa. The findings demonstrated that the human capital and gender of SMMEs is not strongly associated with success in securing bank finance. From a race perspective, white entrepreneurs are more likely to be approved for bank finance than other race groups.

Drillis and Contini Revisited Using Correlation Analysis for Indonesian Adults Anthropometry

Markus Hartono, Linda Herawati Gunawan
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Research on anthropometry, nowadays, becomes more essential and important due to the complexity of products, devices, equipment and systems for users. The most challenging part in anthropometry study is that the lack of sufficient valid, reliable and sustainable anthropometric data for certain nationalities. According to recent studies, an attempt to provide a comprehensive anthropometric measurement system has been conducted. Following to the previous study by Drillis and Contini, this study uses a similar methodology on how to predict any anthropometric measures through sufficient accuracy from a single measure of stature and weight, taken from 119 Indonesian adults. The expected contribution of this study is that to find which measures are significantly associated with stature and weight, respectively. It is of highly beneficial for product designers and any human-work system interactions.

An Improved System Safety Analysis Method Based on Accimap

Juanjuan Gao, Jin Tian, Tingdi Zhao
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As a systems-based technique for accident analysis, Accimap involves the construction of a multi-layered diagram in which the various causes of an accident are arranged according to their causal remoteness from the outcome. Though there is systematic research and development for this technique, Accimap is inadequate in terms of the contributory factors identified. This paper presents a modified Accimap by integrating a representative second generation human reliability analysis method(CREAM: Cognitive Reliability and Error Analysis Method) into the traditional Accimap, using the methodology of trace analysis. This paper applies the modified method to analyse the Black Hawk Fratricide Incident from a more comprehensive view of the accident and also for the effectiveness and validation of the method.Within the innovative views of the contributory factors in hierarchy such as the planning, management, and regulatory bodies, the modified Accimap will be more advisable to be used for analyzing accidents in the complex social-technical system.

An Empirical Study of Intuition and its Context

Said Elbanna, Yasir Fadol
Qatar University, Qatar
Our knowledge of what determines intuitive decision making is still in its early stages, although there is an increasing interest in intuition in the last decade. In order to fill this gap, this study examines the differential contribution made by different perspectives on context (decision, environment and firm) toward explaining intuition. The results indicate that the characteristics specific to the firm and to the environment appear to be more significant to intuition than does the nature of the decision; and that the impact of contextual variables vary from one dimension to another.

Comparing Psychological Empowerment Levels of Field Employees in Small and Large Companies of the Oilfield Service Industry

Ngozi Onyemeh, Chan Wai Lee, K. A. Yap
University of Nottingham, Malaysia
This paper examines the difference in levels of psychological empowerment in Malaysian small and large oilfield service company's field employees in order to understand in which of the settings psychological empowerment strategy is most effective to the point the employees really feel empowered. According to [1], size related characteristics of small companies usually manifest in challenges such as ability to offer career paths or reward packages equitable with large organizations. A total of 41 oilfield service field employees were investigated from 4 different oilfield service companies. The results indicate that field employees in smaller oilfield service companies experience less psychological empowerment compared to the field employees in the larger companies, suggesting that small oilfield service companies need to do more to empower their employees.

Airport Security Screeners Reliability Analysis

Artur Kierzkowski, Tomasz Kisiel
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The article presents guidelines for maintaining the level of safety in air transport. Methods of determining the reliability of the security screener at the airport were presented. An analysis was performed using the following HRA methods: TESEO, HEART, HCR and THERP. The authors present a comparison of methods and an assessment of the possibility of using them to determine the reliability functions of the security control operator. Were presented and compared the results obtained for a real system (for qualified operators of security control at the airport) with theoretical results obtained from above mentioned methods.

Global Sensitivity Analysis for Computationally Expensive Models Based on Radial Basis Function Interpolationand Optimization

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We present a surrogate and optimization-assisted global sensitivity analysis framework for multimodal and computationally expensive "black box" objective functions f(x), which could be a simulation or computer code. A surrogate surface s(x) based on an affordable number of evaluations of f(x) creates an approximation of f(x) for all x. The evaluation-intensive global sensitivity analysis (Extended FAST) is performed on s(x). We compare 4 algorithms including a) optimization plus RBF surrogate, b) optimization plus polynomial regression surrogate, c) RBF based on Latin Hypercube (LHD) sampling with no optimization, and d) conventional application of Extended FAST global optimization (with no surrogate). In cases a) and b) the optimization points are supplemented with LHD evaluations. In all cases a) (which is an algorithm called SA_SO-GRBF) substantially outperformed the alternatives by having the smallest error on both total global sensitivity (with parameter interactions) and first order sensitivity (without parameter interaction).

The Multiple Vehicle Inventory Routing Problem for Perishable Products

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In the last decade many companies have recognized that important cost savings and improved service levels can be achieved by effectively integrating production plans, inventory control and transportation policies throughout their supply chains. In this paper, an integrated multi-commodity production and distribution planning model is presented. A proposed Mixed Integer Programming (MIP) model is developed with the objective of producing an optimum integrated production and distribution plan. The model considers the number of products to be produced and distributed in the different planning periods. It takes into account the production capacity, the vehicles capacity, the demand of each product, and the total costs associated with production, inventory, and transportation. An illustrative numerical example is presented.

The Robust Quay Crane Allocation for a Discrete Bulk Material Handling Port

Saurabh Pratap[1], Manoj Kumar B[1], Naoufel Cheikhrouhou[2], M. K. Tiwari[1]
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[2]*University of Applied Sciences Western Switzerland, Switzerland*
This study investigates the quay crane allocation problem with respect to vessel assigned to a particular discrete berth at a bulk material handling port. In the proposed model,vessels at the anchorage are berthed on a First in, first out (FIFO) basis at the port, and then the quay cranes are assigned to the berth dynamically before berthing and during unloading of the vessel. To solve the model, we used the Block Based Genetic Algorithm (BBGA) and Genetic Algorithm (GA). Computational study is conducted using the real data provided by a port located on the Eastern Coast of India.

Solving the Robotic Cell Problem with Controllable Processing Times

Mohammed Al-Salem, Mohamed Kharbeche, Wael Khallouli, Mohamed Haouari
Qatar University, Qatar
We investigate the Robotic Cell Problem with Controllable Processing Times (RCPCPT). This problem arises in contemporary automated manufacturing systems and requires simultaneously scheduling jobs, machines, and the transportation device. The RCPCPT is modeled as a flow shop problem with a blocking constraint, a single transport robot, and controllable processing times. This latter feature of the model refers to the fact that the processing times are not fixed but vary linearly with the acceleration cost and therefore should be determined as part of the solution problem. We propose a nonlinear mixed-integer programming (NMIP) formulation as well as its linearization. Next, we use the new linear model for the RCPCPT to derive a LP-based and MIP-based heuristics. Finally, we present a computational study of the proposed formulation and the heuristics and we show the MIP based heuristic delivers high quality solutions for large instances while requiring very short CPU times.

Combinatorial Auction Algorithm with Price-Adjustment Mechanism for Airline Crew Scheduling Problems

Daiki Sasaki, Tatsushi Nishi
Osaka University, Japan
In this paper, we propose a combinatorial auction algorithm for airline crew scheduling problems. The objective is to achieve the equalization of working time for crew members. In the combinatorial auction algorithm, each crew member is regarded as a bidder and the combination of the rosters is considered as the packages of items that a bid can be placed. A new combinatorial auction algorithm with price-adjustment mechanism is proposed. Two types of bidding algorithms are combined. One is the random bids with neighborhood search, and the second one is the solution derived by the Lagrangian relaxation with subgradient optimization, which is called as the price adjustment mechanism. The effectiveness of the proposed method is shown from the computational results.

Multi-Objective Constrained Vehicle Refueling Planning: Complexity and Polynomial-Time Approximation Schemes

Shieu-Hong Lin
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For point-to-point direct delivery over the transportation network, timely delivery of commodity and reduction of total fuel cost are both important objectives to consider. Since fuel prices can vary significantly over a broad region, often there is a tradeoff between fuel cost and travel time. A short path may not be economical in terms of fuel cost while routing through regions with lower fuel prices may take more time. In this paper, we consider multi-objective constrained vehicle refueling planning in two settings: (i) minimizing the fuel cost given an upper bound on travel time or (ii) minimizing travel time given an upper bound on the fuel cost. We prove that the computational task is NP-Complete even when the fuel price is fixed or when the amount of fuel consumption and the travel time are linearly dependent. We then show fully polynomial-time approximation schemes for multi-objective vehicle refueling planning in these two situations.

Data Analysis of Social Community Reputation: Good Questions vs. Good Answers

Jwen Fai Low, Davor Svetinovic
Masdar Institute of Science and Technology, United Arab Emirates

Developing an understanding of the behavior and reputation of community members, and the relationships between them, can help community developers and managers to build and maintain better communities. We analyzed Stack Overflow, currently one of the most popular Q&A communities for developers, in order to understand the relationship between user behavior and reputation. Our data analysis of user activities, as well as our analysis of the each behavior's reputation impact, has revealed that asking good questions is an important behavior in Stack Overflow. Good questioners have higher reputation, in spite of the reputation system's design, and they are also more likely to engage in other reputation-positive behavioral activities.

Comparative Bibliographic Analyses of the Global and Japanese Databases in the Field of Solar Cell

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[2]*Japan Science and Technology Agency, Japan*

The purpose of this research is to confirm that domestic database, in the case of J-GLOBAL, will be able to be used for strategies of science and technology in the same way as global database, such as Web of Science. Domestic databases have potentials to provide unique cutting edges, due to the custom of presenting it in local conferences before publishing it in global academic journal. In addition, differences between Japanese dataset and other language's dataset are extracted. Consequently, it was proven that J-GLOBAL can be used to identify emerging researches in the field of solar cell. As one of emerging fields, "perovskite solar cell" is detected.

Production Data Analytics for Production Scheduling

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[2]*East China Normal University, China*

Nowadays, production scheduling researches mainly focus on developing various optimization models and algorithms, but the problem how to determine parameters in the models and algorithms has not attracted enough attention from researchers. It leads to that scheduling results do not fit to the manufacturing practice very well nor are accepted by the workers. As IT technology develops, abundant low-level data has been collected. By analyzing low-level operation data, more accurate values for the parameters in production scheduling models and algorithms can be estimated, making the scheduling results fit the actual manufacturing implementation better. Moreover, workers' preference can also be generalized and reused in scheduling, making the scheduling results accepted by the workers more easily. Therefore, this paper proposes a production data analytics method for estimating parameter values and generalizing humanized scheduling rules for production scheduling. The research is implemented on the basis of data from an oil refinery.

Index Tracking Using Data-Mining Techniques and Mixed-Binary Linear Programming

Oliver Strub[1], Philipp Baumann[2]
[1]*University of Bern, Switzerland*
[2]*University of California, Berkeley, United States*

Index tracking has become one of the most common strategies in asset management. The index-tracking problem consists of constructing a portfolio that replicates the future performance of an index by including only a subset of the index constituents in the portfolio. Finding the most representative subset is challenging when the number of stocks in the index is large. We introduce a new three-stage approach that at first identifies promising subsets by employing data-mining techniques, then determines the stock weights in the subsets using mixed-binary linear programming, and finally evaluates the subsets based on cross validation. The best subset is returned as the tracking portfolio. Our approach outperforms state-of-the-art methods in terms of out-of-sample performance and running times.

Software Analytics Study of Open-Source System Survivability Through Social Contagion

Jwen Fai Low, Tennom Yathog, Davor Svetinovic
Masdar Institute of Science and Technology, United Arab Emirates

Free, Libre and Open Source Software (FLOSS) development has grown in prominence in recent years as the software development approach of choice. However, the factors responsible for maintaining development interest in them are still poorly understood, as FLOSS projects differ significantly from traditional for-profit closed-source software development. To address that knowledge gap, we have analyzed data from GitHub, an open source code repository which provides extensive records on a multitude of collaborative software engineering projects. Using machine learning algorithms, we sought out patterns in the data that might help us understand how projects survive. Our findings suggest that the impressions propagated by the users of software projects to other users strongly influence the projects' survival, as one would expect in a social contagion model.

An AIS-Based Framework for Real Time Monitoring of Vessels Efficiency

Hongtao Chi, Giulia Pedrielli, Thomas Kister, Szu Hui Ng, Stephane Bressan
National University of Singapore, Singapore

Maritime transport is one of the most energy efficient and one of the lowest CO_2 emitting modes of transport. Nonetheless, the industry's carbon footprint is significant. Stakeholders recognize the need for continuing efforts to curb CO_2 emissions. Such efforts require the ability to measure individual vessels' energy efficiency. To this end, several energy efficiency metrics/indices have been developed for tracking real time CO_2 emissions by marine vessels.

We propose a new methodology to calculate and monitor individual vessel's energy efficiency and carbon emissions in real time through the Real-Time Energy Efficiency Operating Index (RT-EEOI).We demonstrate the practicality of the proposed methodology by presenting a software architecture implementing it.Specifically, by combining a vessel database with live data from the Automated Identification System (AIS), we calculate the RT-EEOI index.The system has been deployed to monitor traffic in the Southwest part of the port and strait of Singapore. We propose an example of implementation of the proposed framework in the Singapore waters to show how it can be deployed in the scenario of real time efficiency tracking.

Material Ordering with Discount Policy Integrated with a Project Scheduling Problem

Aria Shahsavar[1], Babak Abbasi[2], Nima Zoraghi[1]
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[2]*RMIT University, Australia*

In this study, the integration of the total quantity discount policy in materials procurement of a project scheduling problem is considered. The problem is mathematically formulated and a hybrid meta-heuristic method is developed for the problem. The proposed algorithm is tested on 810 benchmarks and is compared with optimal or near optimal solutions.

Development of OmniPlusTM Methodology for Sustaining Continuous Improvements

Amrik Singh Bhullar, Chin Wei Gan, Roland Lim, Ming Hon Toh, Bin Ma
Singapore Institute of Manufacturing Technology, Singapore

Productivity has been identified as a key strategy by the Singapore government to drive economic growth for the next 10 years. However, most of the efforts have been focused on developing and adopting tools and techniques as point solutions to improve productivity. A new methodology is needed that automates making improvements everyday as part of the job routine of every employee and has an explicit emphasis on leadership commitment. In this paper, we improve on our current OmniMethodologyTM by introducing a new OmniPlusTM methodology to include focus on improving the people while maintaining the need to improve the process. The paper explains the stages and sections of the new methodology. Results of initial testing show how some companies have used it effectively to change the behavior of their employees towards sustaining continuous improvements.

An Iterative Three-Stage Algorithm for the Pre-Marshalling Problem in Container Terminals

Zijie Ren, Canrong Zhang
Tsinghua University, China

The pre-marshalling problem converts an initial layout of a bay into a desired final layout in which no higher-priority containers with smaller container type are buried under those with larger container type. After defining different clusters and groups of containers, an iterative three-stage algorithm is proposed to this problem: in the first stage, a local optimization is applied; in the second stage, one stack is selected and then emptied out; and in the third stage, the emptied stack selected in the second stage is refilled. Public data is applied to compare our algorithm with the existing ones in literature, and the experiment results show that our algorithm outperforms others in terms of the number of re-handling movements.

Loading Sequencing with Consideration of Container Rehandling

Yanwei Shen, Canrong Zhang
Tsinghua University, China

During the loading operations in container terminals, the handling time of yard cranes for retrieving a container depends on the stacking relationship between containers, which changes once rehandling occurs. Since rehandling is hard to be prevented in practice, the handling time (especially the setup time) of yard cranes for each container is dynamically changing. This research takes this dynamic property into consideration whereas previous work generally considered the handling time is deterministic. A mathematical model is constructed for this problem. An algorithm based on Greedy Randomized Adaptive Search Procedure (GRASP) is developed. The numerical experiments show the effectiveness and efficiency of the proposed algorithm. In addition, the cases with and without consideration of rehandling have been compared through numerical experiments.

An Iterated Local Search Algorithm for the Multi-Vehicle Covering Tour Problem

Yosuke Takada[1], Yannan Hu[1], Hideki Hashimoto[2], Mutsunori Yagiura[1]
[1]*Nagoya University, Japan*
[2]*Tokyo University of Marine Science and Technology, Japan*

Given two sets of vertices V and W, where each vertex in V covers a subset of W, the multi-vehicle covering tour problem asks to determine a number of vehicle routes on a subset of V so as to minimize the total distance under the constraint that every vertex in W must be covered by vertices in the routes. We propose an iterated local search algorithm that features two procedures to improve solutions: one consists of three operations to remove or insert vertices from or into a route; the other is path reconstruction that replaces a partial path with an optimal one, for which we propose a dynamic programming algorithm. We also propose efficient methods to reduce the computation time to search for improved solutions in neighborhoods. The computational results on benchmark instances show that our algorithm performs better than existing methods and is efficient for large-scale instances.

Improving Fairness in Staff Assignment: An Approach for Lexicographic Goal Programming

Tom Rihm[1], Philipp Baumann[2]
[1]*University of Bern, Switzerland*
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In many staff-assignment problems, a large variety of requirements has to be considered when assigning employees to work shifts. As the importance of the requirements is often described in a hierarchical manner, lexicographic goal programming has been used to minimize the number of requirement violations. The resulting schedules are in general of high quality with respect to requirement violations but may lack acceptance by employees because of an unfair distribution of the violations. We introduce a novel approach for lexicographic goal programming that allows to improve an existing schedule in terms of fairness without deteriorating its quality with regard to requirement violations. The effectiveness of the proposed approach is demonstrated for a test set derived from real-world data.

Session	Systems Modeling and Simulation 2
Date	8/12/2015
Time	09:00 - 10:30
Room	MR330
Chairs	Suthep Butdee, Manuel de la Sen

An Optimization Approach for Congestion Management for Traffic Signal Control Systems via First-Order Hybrid Petri Nets

Ryotaro Yamazaki, Tatsushi Nishi
Osaka University, Japan

In this paper, we study an optimization approach for congestion management of traffic signal control systems via first-order hybrid Petri nets. The traffic signal control problem is represented by the optimal firing sequence problem for the first-order hybrid Petri net (FOHPN). In order to solve large scale problems, the Petri net decomposition approach for FOHPN is developed. The computational results show that the computation time can be reduced by the proposed approach and the outcome of the FOHPN decomposition approach for congestion management.

A Modeling and Simulation Approach for Support Network Considering Multi-Service Flows

Xiang Li[1], Lin Ma[1], Lan Peng[1], Jingfu Wang[2]
[1]*Beihang University, China*
[2]*China Academy of Aerospace Standardization and Product Assurance, China*

Under the integrated joint operations background, the support system is required to exchange logistics and information flow with the environment more accurately, rapidly and frequently. The equipment support system has gradually evolved to the network structure due to the versatile mission requirements. This paper focuses on developing a simulation model for the support network covering influences of multi-service flows on network node states. Based on the characteristics of equipment supply support and maintenance support, a network model including support nodes and demand nodes is established. A new modeling and simulation method of support system is designed. Discrete event simulation method and process interaction simulation strategy are used to study the performance variation of equipment support network, and the results show that it is efficient. This modeling and simulation approach has certain value for the further study on Network-centric equipment support system.

Dedicated Refurbishing Line Optimization by Simulation

Kevin Calvi[1], Sung Hoon Chung[1], Manthos Economou[2], Rohan Kulkarni[2], Ross Havens[1]
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[2]*Google Inc., United States*

Simulation has gained importance in the consumer electronics After Market Service (AMS) industry, due to factors such as uncertainty in product returns, stochastic processing times, and unknown or hard-to-predict product demand. Remanufacturing and refurbishing systems may not be analyzed using closed-form expressions due to the complexity caused by above-mentioned factors. In this pa-per, a detailed simulation optimization study is proposed to better allocate resources within the testing and refurbishing processes. Time studies have been conducted to identify the probability distributions that will be used in the simulation. Also a detailed simulation model using SIMIO® is presented to reflect the complete refurbishing process. We present a framework that can be used in decision-making sequences, allowing us to identify current bottlenecks and evaluate alternate scenarios to improve the system performance.

Impact of Input Data Parameter Uncertainty on Simulation-Based Decision Making

L. Sathishkumar, Jayendran Venkateswaran
Indian Institute of Technology Bombay, India

Simulation-based optimisation is popularly employed to determine the best system configuration of complex simulation models. However, it is assumed that the input distribution and parameters are known. In this paper, the input distribution parameter is assumed to be unknown and the impact of the same on the optimal system configurations obtained is investigated. Bootstrapping of the sample data is performed to generate multiple parameter estimates, each of which is used to obtain an optimal solution using regression based simulation-optimisation. It is proposed that the convex combination of the multiple optimal solutions got using different regression models gives a better estimate of the `true' optimum. The above approach is illustrated using the classical (s,S) inventory policy.

Bayesian Network and System Thinking Modelling to Manage Water-Related Health Risks from Extreme Events

Edoardo Bertone[1], Oz Sahin[1], Russell Richards[2], Anne Roiko[1]
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[2]*University of Queensland, Australia*

A combination of Bayesian Network (BN), System Dynamics (SD) and participatory modelling to develop a risk assessment tool for managing water-related health risks associated with extreme events has been developed. The risk assessment tool is applied to the Prospect water filtration plant system, main source of potable water for the Sydney metropolitan region. Conceptual models were developed by the stakeholders around the key indicator parameters of turbidity, water colour and cryptosporidium. These three conceptual models were and used for developing separate BN and SD models. Here we present the development of a BN designed to understand the risk of extreme events on the ability to provide drinking water of a desired quality. The model has undergone development and preliminary parameterization via two participatory workshops. However, its development is an ongoing process with the next stage involving supplementing the 'expert opinion' used to parameterize the model so far with 'hard' data.

Cold Forging Deformation Analysis for Stainless Steel Using DEFORM

Suthep Butdee, K. Uten
King Mongkut's University of Technology North Bangkok, Thailand

Head cold forging is a widely common production used to achieve economical processes and less energy consumption especially using to form a hard material like stainless. Lots of previous studies have shown on the various results of using DEFORM 3D. This paper purposes the forging deformation analysis for stainless steel SUS 302 based on an industrial conditions of manufacturing process. The study result has founded that the five punches and five dies with 64 stokes are optimal for the specimen, a fastener production. The details are illustrated and discussed.

Session	Project Management 2
Date	8/12/2015
Time	11:00 - 12:30
Room	MR330
Chairs	Ralph Riedel, Zhe Zhang

Management of "Soft" Success Factors in Projects

Mandy Thurm, Ralph Riedel, Egon Mueller
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Success of projects depends on a multitude of factors. Whereas, the discipline of project management covers mainly "hard" (quantitative) factors. It is common knowledge that there is also a big portion of intangible "soft" factors which can hardly be captured, modelled and controlled. That represents a gap in project management research as well as in practice. Therefore, a novel conceptual approach for modelling and controlling such factors is presented in this paper. Its general idea is based on the combination and advancement of existing methods from decision theory and systems dynamics. The result of the research is a methodology for the control of intangible project success factors validated in a plant engineering case study. The approach contributes to the toolbox of project management and goes beyond its existing limitations, hereby, reflecting the real world to a bigger extend.

A Hybrid DEA-ANP Method for Measuring Complexity in Engineering Projects

Meng-Xuan Cui, Chao Fang
Wuhan University, China

With the increasing influence of complexity in engineering projects, managers now realize that it is essential to measure complexity quantitatively. Based on a literature review regarding the existing complexity measurements, the criteria, subcriteria and their interdependencies are identified. Then, we propose a new approach involved of the analytical network process and data envelopment analysis. The hybrid DEA-ANP method permits to assess the relative complexity scores of engineering projects. A numerical example of applying the proposed approach is illustrated.

Acceptance and Usage of ERP Systems: The Role of Institutional Factors in ERP Post-Implementation

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One important challenge in ERP implementation is the acceptance and usage of ERP systems by their users. This study aims to identify important antecendents of ERP acceptance and usage among individual users, considering specifically the complex nature of ERP systems. A research model was developed, incorporating two antecedents from DeLone and McLean IS success model, two technological related antecedents and three antecedents related to institutional s upport in the post-implementation stage. A total of 173 sample was collected through a survey among ERP users working in three large firms in Indonesia. The model was validated and 14 hyphoteses were empirically tested using structural equation modeling (SEM) technique. The results support the proposed model to a large extent, highlighing the importance ERP symbolic adoption for ERP use, managerial commitment and technical support as the antecedents related to institutional support, and perceived fit and perceived dependability as the antecedents related to technology characteristics.

A Bid & Auction Mechanism for Resource Management in Project Portfolios

Minghui Chen, Zhe Zhang
Nanjing University of Science and Technology, China

This paper develops a bid & auction mechanism to help decision making in project portfolio management, either to allocate global resources, or to decide whether a new project should be accepted or not. This mechanism is developed based on a multi-agent system model which is inherently a bi-level structure. In the upper level, an auction agent is employed to represent the benefit of the portfolio through allocating global resources. In the lower level, project agents are employed to represent the benefit of corresponding projects (or programs) through managing specific schedules. Moreover, cash is employed as the bid target here to ensure the truthfulness of information.

Causal Analysis of System Failures from IT Project Trouble Reports

Atsushi Shimoda
Chiba Institute of Technology, Japan

One of the leading causes of IT system failures is the failure of IT system development or operational projects. These developmental or operational failures may result from software faults or erroneous IT system setups or operation. To prevent such failures and their recurrence, it is essential to clarify the reasons for past failures. This paper proposes a method to clarify the causes of IT system development or operational project failures that lead to system failures. The proposed method extracts the causal relationship between a project failure item and a system failure using a statistical operation. Furthermore, structural information on the causes of failure is generated using interpretive structural modeling. Eleven failure items were structurized in an experiment that analyzed 40 trouble reports from IT projects. Consequently, a general pattern relating project failures to system failures was extracted.

Assignment of Critical Path for a Building Site Based on Multicriteria Approach

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[2]*Universidade Federal de Pernambuco, Brazil*

The project management involves control through performance measurement. For this, it is necessary to study the project from the point of view of multiple aspects. In the construction sector, there is a lack of suitable methods to assess the activities that must be performed for the fulfillment of a project. This article seeks to evaluate the critical path of a building site using SMARTS, a multicriteria decision aid method. Results show that the analysis of PERT/CPM network only through their perspective of time does not give a comprehensive and global view of other important attributes to be controlled by a project manager. It is necessary a focus on multiple aspects.

MDP-Based Outpatient Scheduling for Multiple Examinations

Yang Liu[1], Na Geng[1], Yanhong Zhu[2]
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[2]*Shanghai General Hospital, China*

Timely examinations are important for the patients to be properly diagnosed and treated. Different urgency levels of patients, different requirements of examinations and patients' behavior make the patients scheduling difficult to solve. To deal with this problem, this paper starts from two examinations, and proposes a Markov Decision Process (MDP) model for scheduling six types of outpatients by considering two different waiting time targets and no-shows. The objective is to maximize the expected revenue of accepting outpatients and minimize the expected overtime penalty. Numerical experiments are conducted to show the optimal policy for each type of patients. Based on the observation, a heuristic rule is proposed for scheduling patients. Numerical experiments show that the performance of the proposed heuristic rule is quite close to the optimal control policy and much better than first-come-first-serve rule, especially when the workload of the system is heavy.

Solution Methods for the Planning and Scheduling Problems of Outpatient Chemotherapy Units

Mahmoud Heshmat, Amr Eltawil
Egypt-Japan University of Science and Technology (E-JUST), Egypt

Chemotherapy outpatient planning and scheduling is a complex problem. Many factors feed this complexity, such as the variability inherited in all the stages of the oncology and infusion process and uncertainty in some of its parameters. This paper explains the problem and identifies the different solution methods. Related literature is combined and summarized with focusing on their contributions. Moreover, current gaps in literature are identified and possible research directions are proposed.

A Weighted Multi-Objective Therapist Assignment Problem in Hong Kong

Meiyan Lin, Kwai-Sang Chin, Kwok Leung Tsui
City University of Hong Kong, Hong Kong SAR

Recently, Home Health Care (HHC) services systems have attracted increasing attentions from researchers because of its growing demands from elderly, disable and chronical people. Rehabilitative service is one of the most important types of HHC services and provided by skilled therapists who work at different healthcare facilities. This article presents a multi-objective optimization mathematical model for constructing weekly assignment for therapists who provide rehab care service and aims to satisfy the demand for service at minimum cost (delay cost, reassignment cost, overtime cost) subject to a variety of constraints related to continuity of care, priority rules, overtime rules, and workload utilization requirements. By minimizing cost and satisfying requirements of patients and therapists, high service quality can be achieved. The assignment problem is solved with CPLEX in terms of the real instance. By adjusting the weights associated with different objectives, the operators will make decisions easily and propose proper strategies.

Efficiency and Productivity of Publicly-Traded Bio-Pharmaceutical Companies in Taiwan

Yi-Hsing Lin, Chun-Fu Hong
National Quemoy University, Taiwan

The biopharmaceutical industry has been rapidly growing these last few decades due to the breakthroughs in molecular biology since the 1970s. The Taiwan government initiated a program for developing the biotech industry as early as the 1980s. However, Taiwan's biopharmaceutical companies have failed to deliver any new drugs to the market in the last 30 years. Therefore, the managerial efficiency of these biopharmaceutical companies in Taiwan needs further examination. Traditional managerial efficiency measurements are either output-oriented or input-oriented, respectively. In this study we apply the directional distance function to estimate the relative managerial efficiency of eleven publicly-traded biopharmaceutical firms during the period 2012-2014. We also measure their productivity by means of the Malmquist-Luenberger index. Our results show that, during 2013-2014, the mean productivity of these companies declined, which can be possibly explained by the significant reduction in mean gross sales due to the occurrence of a serious food safety crisis in 2014. Taiwan's pharmaceutical firms have to pay more attention to their quality control over ingredients that are being used in food and drug production.

Process Optimization for Operating Room Base on Pro-Model

Qinglian Lin[1], Long Liu[2], Duojin Wang[3], Yan Li[1]
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This paper deals with the optimization of operating room (OR) process. This topic is especially of interest in view of the current attempts of hospitals to improve the efficiency of OR. In this paper we introduce the concept and methods of process, and do a research for OR process in hospital A with the thought of process management. We use Pro-model to build a model for the present and optimized process for OR to compare the running results. The aim of this thesis is to bring forward the optimization scheme through in-depth investigation and study for OR process, to seek the humanization, standardization, efficiency, and institutionalization for OR management, and to broaden the application of process management through specific study in a concrete process, and to make a beneficial exploration to patient-oriented within medical care.

Workforce Modelling, Analysis and Planning: A Feasibility Study in a Local Nursing Home

P. P. L. Leung, C. H. Wu, G. T. S. Ho, W. H. Ip, W. L. Mou
The Hong Kong Polytechnic University, Hong Kong SAR

Hong Kong is becoming an ageing society. The growth in the demand of residential care places, together with the increasing complexities of illnesses and varieties of procedures, result in heavy workloads and pressures of local nursing staff. In particular, nursing homes are experiencing high nursing staff turnover and continual manpower short-age. Despite the increasing demand from academic, commercial and political aspects for better healthcare resources allocation, studies conducted on nursing homes' workforce planning are limited. Also, existing studies seldom formulate the nursing workforce planning problem or propose feasible models for practical usage. In this paper, an optimization-based nursing workforce planning model is proposed for enhancing the service capacity of local nursing homes. In order to show the feasibility, a simplified model has been solved by Excel Solver while the proposed model will be solved by other algorithms in the near-future.

A Standards Framework for Value Networks in the Context of Industry 4.0

Alexandra Mazak, Christian Huemer
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The German initiative Industry 4.0 will involve amongst other issues networking and integration of several different parties (e.g., manufacturing companies, suppliers, customers, sub-contractors) through value networks. This initiative underpins that this collaborative partnership will only be feasible if standardization and open standards are available. For this purpose a reference architecture is needed to provide a technical description of these standards. In this context interoperability plays a major role for the seamless exchange of data and information among partners in these value networks. Interoperability involves the interaction of different systems and their users. Information modeling is a key concept for providing interoperability. In this paper, we present a standards framework that highlights how existing standards intertwine to establish value networks in an Industry 4.0 context.

Optimization of the Rubber Coagulation Process for Wastewater Treatment in Latex Separator Disc Cleaning System

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The objective of this study is to find the optimal combination of factors used in the process of wastewater treatment to collect the suspended rubber content from the disc cleaning process. The factors include the amount of GRASS2 and the waiting time required for the rubber to coagulate. The study was conducted using two sets of experiments. One is to find the deterministic optimal amount of GRASS2 and waiting time, and the other one is to find whether it is practical to use the fiber optic sensor as a tool to indicate the sufficient amount of GRASS2 required. The results from the experiments show that using the fiber optic sensor requires a greater amount of GRASS2 than the deterministic method since the objective function of the sensor model was to maximize light intensity in the wastewater, while the objective function of the deterministic model was to maximize the percentage of the achieved rubber contents.

Modeling Tunnel Profile using Gaussian Process

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Tunnel profile is an important quality measure for deformation monitoring throughout lifetime of a tunnel.Recently, statistical models such as cylindrical regression have been introduced to model the tunnel profile with the help of Terrestrial Laser Scanning (TLS) surveyed point cloud data. However, these models cannot capture the local variability of tunnel surface, which is important for deformation monitoring. This paper presents a Gaussian process (GP) based approach to model the tunnel profile. We introduce a reading-surface profile which uniquely determines a three-dimensional tunnel model in Cartesian coordinate system. Based on the reading-surface, we can fit the GP model and obtain continuous prediction of the tunnel surface. We present a case study to demonstrate that our model is flexible to capture the local variability of the tunnel surface, and therefore has great potential for deformation monitoring.

Multi-Resolution Modeling on Complex System Integrated Logistic Support

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The development of complex system, such as complex ship or warship, usually contains concurrent, iterative and coupling processes. Based on multi-resolution modeling, this paper presents a new approach on thinking and implement for analysis and organization in Integrated Logistic Support (ILS). At high system level, a macro low resolution model is presented by System Dynamics, indicating whole relationship between life cycle stages and advantages of early consideration on ILS. Secondly, the model is built by structure matrix and with variable resolution according to system disaggregation and ILS task needs. The model with variable resolution includes techniques of Design Structure Matrix (DSM) to analyze complex interactions between system compositions and task procedures. Finally taking ILS analysis for instance, an integrated technique is designed for aggregation.

Practical Design of 13.56MHz Near Field Communication (NFC) and Radio Frequency Identification (RFID) Antenna using Ferrite Sheet on Metallic Surface by Network Analyzer

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Radio Frequency Identification (RFID) and Near Field Communication (NFC) technology is popular for item tracking and secured communication system. Both technologies make use of 13.56MHz radio wave and loop antenna. Most of the application needs to be implemented in small mobile devices which make the loop antenna deign a relatively challenging job. Furthermore, if the Tag Antenna or the Writer/Reader loop antenna needs to be placed on metallic surface in a small casing. The magnetic field will be attenuated and the loop antenna efficiency will drop. Hence, data transmission distance will be reduced drastically. A way to counter the metallic surface effect on the loop antenna is by using ferrite sheet with high permeability μ in between the loop antenna and the metal surface. A practical example of designing a 13.56MHz loop antenna with ferrite sheet on metal plate by Network Analyzer will be discussed here.

An Action Design Research on Development and Deployment of a Computer- Based Group Discussion Support Tool for Achieving Consensus and Culture Change at an Educational Institution

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Organisational culture change is a long and complex process that typically takes years to complete and has a very low success rate. This project addresses the problem by the proposed use of an Action Design Research Methodology to build and deploy an IT artifact named Organisational Culture Assessment Instrument-Spilter (OCAI-Spilter) to speed up cultural change while reducing failure rate. OCAI-Spilter should be able to fast-track culture change by addressing the problem of scalability and process losses encountered in most change projects involving large numbers of people. We used an iterative prototyping process to continuously refine the tool in use. We also reviewed the design principles in Action Research Design to improve the usability of the tool. New design principles and learning were derived from this process. Finally, we showed the effectiveness of the artifact by measuring the results of the tool in use through culture surveys and alignment, as well as idea generation that was administered through the tool.

Operational Excellence Driven by Process Maturity Reviews: A Case Study of the ABB Corporation

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World-class operations need to be efficient and cost effective. Maturity models are examined in this research as a tool for operational development in manufacturing companies. Several leading frameworks are analysed. These models provide baseline to develop companies operations and ultimately the creation of competitive advantage over competitors. The use of maturity models allows organizations to assess organizational methods and processes according to management best practices and against a clear set of external benchmarks. An industry example is presented from the ABB Corporation to showcase the usage of process maturity reviews in an industry context. To succeed in global competition, the ABB Corporation has strongly emphasized a culture of continuous improvement. Case company uses maturity models as a start of the continuous improvement loop, with aim to achieve world-class operations.

Kriging Surrogate Model for Compliant Mechanism Six Sigma Robust Optimization Design

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Owning to the shortages of the compliant mechanisms based on traditional optimization design, such as little consideration of the influence induced by design variables and external load, could lead to the low solution efficiency of iterative optimization. Thus a new approach for the robust optimal design based on the concept of DFSS (Design for Six Sigma) was proposed in present study, which combined experimental design with Kriging surrogate model as well. And the flexibility and the stability of compliant mechanisms based on the compliant plate was optimization designed in detail. Against to the traditional optimization design, the proposed method can not only improve the robustness and reliability of flexible cantilever but enhance optimization efficiency. Summary, the proposed method plays an essential role in strengthen the robustness and reliability of optimization design. Furthermore, it provide a approach to study the expansion the application of compliant mechanisms in enhancing the interference resistance in cutting edge such as, micro electro-mechanical system, bioengineering and so on.

A Study of Multivariate Process Capability Indices in Manufacturing Processes

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Process capability indices are considered as one of the effective tools to measure performance in manufacturing processes. Univariate process capability indices (UVPCI) such as Cp, Cpk and Cpm consider single quality variable at a time and multivariate process capability indices (MVPCI) such as MCpm, multivariate process capability vector consider multiple quality variables. UVPCIs are extensively studied by a large number of researchers and practioners. However, till now no appropriate MVPCI is developed based on some unique well defined methodology for assessing capability with appropriate utility and application in manufacturing processes. This study therefore focused on the application of the different multivariate process capability indices developed so far in three case studies, forging, centrifugal casting, and hardening and tempering processes. The results are compared with percentage conforming products as well as amongst the indices themselves. The results show that hardening and tempering is the most and forging is the least capable process.

Confidence Based Quality Evaluation for Total Manufacturing Process Using Comprehensive Process Capability

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In view of the uncertainty in the quality evaluation for manufacturing process and multivariate process capability, a comprehensive evaluation approach is proposed by extending classic process capability index with considering variations of key quality characteristics among the whole manufacturing process, which includes the procurement, machining, assembling and delivery inspection processes. Meanwhile, to avoid the influence of uncertainties, the test, feedback and correction processes for the evaluation approach are added based on the Structure Equation Model (SEM). Then, after the evaluation result is calculated according to the evaluation approach, a method to monitor the deviations of the evaluation results is introduced based on the confidence interval. At last, the quality level of total manufacturing process is evaluated by combing the evaluation results and their confidence interval. Finally, a case study is carried out to verify the proposed method.

COQ Math Model Case Study for Self-Brand Automobile Industry

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With continues quality improvement program (QIP) implemented in self-brand automotive firms, the quality-related cost need to be identified correspondingly. Quality cost math model provides the possibility for research on trade-off between quality level and quality cost. The R/1000@3MIS index is selected as quality performance representative via Pearson coefficient within warranty period, related cost has been interviewed as well. Practical information, a self-brand automotive firm, has been investigated to test the typical four COQ models with regression analysis via curve fitting process. The results verify that all the four COQ models show their excellent performance, which show the optimal quality level and correct implementation on CQIP.

Statistical Monitoring of Longitudinal Categorical Survey Data

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The longitudinal survey is conducted to collect responses from the target population repeatedly over long periods of time, aiming to analyze and monitor the response development as time goes on. However so far systematic detection methodology for survey response changes is still in its infancy. In this regard, this paper sheds light on this field by applying statistical process control (SPC) methodology into monitoring of longitudinal survey responses. Specifically, since generally the longitudinal survey responses are categorical variables which have temporal dependence on their previous values, i.e., autocorrelation, this research firstly proposes a hierarchical model to describe these categorical time series. The model can provide flexible autocorrelation structures for the categorical time series and therefore can be widely applied. Based on this model, this research secondly designs a SPC scheme using likelihood ratio test to monitor the survey responses. Estimation of the in-control (IC) response distribution is also discussed. Numerical studies demonstrate the satisfactory monitoring performance of the proposed scheme. Finally as an empirical evaluation, the scheme is applied to a real survey dataset to detect changes of consumer attitudes towards the economic conditions during a economic crisis.

Application of Bayesian Networks for Product Quality Management in a Multistage Manufacturing Process

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Nowadays, requirements of clients and customers for the quality of product are more and more tightened and complicated. The quality assurance of manufactured product is a key to success in the context of global and competitive economy. Many different parts of final product are made from raw material by multistage manufacturing processes in different places. The risk is that the final manufactured product does not fully meet the requirements. Thus, the paper proposes a method based on Bayesian networks that allows to model impact factors in a multistage machining process on product quality. The root cause analysis can be implemented by using the Bayesian network model. As a result, product quality predicted earlier at design stage can help product designer adjust the product designed and manufacturing processes in order to obtain a robust design with promised quality.

Probabilistic Analytical Target Cascading Combined with Kriging Metamodel for Multidisciplinary Robust Design Optimization

Fengxiang Wang, Mi Xiao, Liang Gao
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Robust design under a multidisciplinary environment is a challenging problem in modern quality engineering because of the organizational and computational burden. In this paper, a probabilistic analytical target cascading (PATC) methodology combined with Kriging metamodel (PATC-KRG) is proposed for robust design of engineering systems considering both objective robustness and feasibility robustness. PATC is an effective methodology for hierarchical multilevel optimization under uncertainty. However, when mathematical models are complex and highly nonlinear, especially when simulations are used, multidisciplinary robust design optimization (MRDO) will be highly computationally expensive. To obtain better computational efficiency, in the PATC-KRG method, Kriging metamodels are used to replace the complicated models, and an exponential penalty function (EPF) formulation is employed for target-response coordination in PATC. A geometric programming problem is used to demonstrate the feasibility and computational efficiency of the PATC-KRG method. Results indicate that the PATC-KRG method can achieve a higher efficiency in support of MRDO.

An Improved Switching Rule in Variable Sampling Interval Hotelling

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In recent years, variable sampling interval (VSI) control charts have been shown to be more efficient than the corresponding fixed sampling interval (FSI) control charts. However, the excessive number of switches between the different sampling intervals is undesirable in the application of the VSI control charts. This paper examines an improved switching rule based on the past and current sampling points for the VSI Hotelling's T2 control chart. The performance of the VSI Hotelling's T2 control chart without improved switching rule is compared with the VSI Hotelling's T2 control chart with the improved switching rule.

Comprehensive Wafer Level Package Die Processing Service Quality Control Enhancement

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Wafer Level Package (WLP) is one type of advanced package with a rapid growth and wide applications in many consumer electronic markets. However, it is different from conventional assembly that after wafer probing, there is no final electrical test to identify the defects produced by WLP Die Processing Service (DPS). This paper focused on three key processes of DPS which are backside grinding, wafer dicing, and tape and reel (TnR) to study the methods of minimizing process and quality risk, and provided a comprehensive solution based on capable processes and intelligent in-process inspections. WLP DPS can achieve the goal of delivering defect-free products to customer by implementing the methods introduced in this paper.

Key Performance Indicators for Operational Quality in the Oil and Gas Industry A Case Study Approach

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The aim of this study is to identify the key performance indicators (KPIs) used to monitor and measure operational quality performance in the oil and gas industry. To investigate this, a face-to-face interview was administered to nine subject matter experts in oil and gas industry from different oil and gas companies in Malaysia, together with a study of two case companies -a service provider and an operator. The results indicate that key performance indicators for oilfield service companies (the service provider)are mostly operational in nature whereas that of the operator is strategic. This result can serve as a guide for businesses trying to adopt KPI in the oil and gas industry.

Multi-Objective Optimization for Inspection Planning Using NSGA-II

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This paper deals with proposing an inspection plan framework for serial manufacturing system with multiple objectives. The proposed framework supports decision making during Monitoring Inspection (MI) and Conformity Inspection (CI) design. It provides a multi-objective mathematical model to find the optimal inspection plan by considering the location, the type of inspection (MI and CI) and the frequency of the inspection as decision variables. The objective functions in this model are formulated to minimize both manufacturing cost and time. In order to solve the model, a non-dominated sorting genetic algorithm version II (NSGA-II) is used. To validate the proposed model and the solution approach, a numerical experiment is carried out on a real industrial case.

Improving Overall Equipment Effectiveness (OEE) Through Integration of Maintenance Failure Mode and Effect Analysis (Maintenance-FMEA) in a Semiconductor Manufacturer: A Case Study

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[3]*Multimedia University, Malaysia*

In order to continue survive in today's competitive business environment, the key to success for many manufacturing companies is productivity. In response to the external pressure of global competition, many firms were compelled to implement and focus on productivity improvement. Numerous quality management approaches and tools such as Toyota Production System (TPS), Total Productive Maintenance (TPM), Failure Mode and Effect Analysis (FMEA) and Lean Manufacturing had been developed in order to achieve operational excellent. TPM is a world-class manufacturing strategy which helps manufacturers to reduce production waste. Overall Equipment Effectiveness (OEE) provides a quantitative metric to measure effectiveness of TPM implementation. This paper presents the implementation of maintenance-FMEA to improve OEE in a semiconductor manufacturing firm. The FMEA was conducted by using five steps approach on a bottleneck process. Results from the FMEA provide a list of prioritized corrective actions which the plant manager can implement to improve equipment OEE.

Gap Analysis of Required and Available Capacity

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One of the common problems in running production facility is capacity versus demand. Well production planning will provide considerable advantages for companies, for instance: the company will be able to minimize losses due to over investment cost on the machine which amounts exceed the needs and inability of the company to meet market demand. The planning production capacity of a manufacturing company itself, there are several alternative, for example, the addition of shift work and the use of overtime. The starting point of the research is based on the failure to meet demand of the underwear manufacture. This research focus on the calculation of available capacity based on standard time, required capacity using forecasting method, the error and the impact of deviation in the future.

A Mathematical Model to Determine the Optimal Size of a Product Line from the Perspective of Manufacturing Companies

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The product line optimization plays a key role to increase the revenue by satisfying consumers' various needs. While the extant studies have made the approaches from the perspective of consumers, in this paper, we propose a product line design problem from the perspective of manufacturers. The concept of neighborhood is introduced that parameterizes consumers' tolerance on specification differences. In addition, the maintenance costs are considered in order to cope with the multi-periodic characteristics of the problem. We demonstrated the applicability of the proposed model to a major mobile phone manufacturing company in Korea. The case study shows that the chosen manufacturing company could have reduced the size of its product line by 64.2%, and saved 68.0% of its product line development costs.

Spiral-Evolutional Production Scheduling System

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Although many production scheduling systems are developed, it is difficult to introduce for medium-sized enterprises, because of high cost of initial and maintenance investment. However functions provided by it, such as available-to-promise under the restrictions of the own process, resource leveling and so on, are required by all of enterprises to make their profits. To realize a scheduling system which can be introduced more easily for the small and medium-sized enterprises, a novel spiral-evolutional scheduling system is proposed in this paper. This system is getting started with gathering of production information in factories, and through progress monitoring a scheduling function is installed and evolved in a spiral evolutional systemizing process. In this paper, the concept of the spiral-evolutional production scheduling system is described, and the implementation of this system and the merit of introduction of it are shown.

Automating Scheduling Tasks; Experience of a Real Case

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The fit between the off-the-shelf scheduling systems and the real life scheduling task has been pointed out as one of the important reasons behind the implementation challenge of advanced scheduling solutions in practice. Recent studies indicate the need for scheduling tools that focus on the actual work routine, characteristics of the scheduling environment, and cognitive tasks of the schedulers. This paper represents results of an action research conducted in a dairy facility in Norway to evaluate functionality and effectiveness of a developed solution for scheduling routines of a case company. A scheduling tool is developed and uses a heuristic approach to address all routine scheduling needs at the case company. The research team went through the tool execution phase. Based on this experience it is concluded that automating scheduling tasks reduces the needed resources and human error, so custom automation of those tasks can be sufficient.

Evaluating Design Alternatives of Constructed Storm-Water Treatment Wetlands

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In recent years, there has been a substantial increase in public awareness in regard to the issues related to climate change. This increase in awareness, has led to the formation of the South East Queensland Climate Adaptation Research Initiative, with the primary objective to adapt the region for the impacts of climate change. As part of this initiative, this paper aims to select the best design alternatives for constructed wetland design for treatment of storm-water runoff in order to effectively treat storm-water runoff and subsequently to prepare the South East Queensland, Australia for the expected impacts of climate change. In this context, to identify and evaluate preferred adaptation alternatives, the authors have undertaken a multi-criteria analysis by using the AHP technique. The combined results of this exploratory study, display that across the three stakeholder groups; Public Health and Safety, Flooding and Drainage Control of highest priority respectively.

Modeling of Periodic Location Routing Problem with Time Window and Satisfaction Dependent Demands

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In most of real cases such as distribution of perishable food with short life time or medicine products, delivery in shortest time or in specific time window is important, so ignoring these requirements may affect customer's satisfaction. In some cases, customers have different specific time windows in different periods and are eager to receive their demands in mentioned time windows. Therefore the predefined demand of customers in each period may be decreased due to the violation of time windows in previous periods. Since classical LRPs are unable to handle these kinds of assumptions simultaneously, so a new model of periodic location problem is proposed which minimizes the lost demand costs over the multiperiods. To show the verification of model and comparison with classic PLRP, a numerical example is used. The results show the efficiency of the proposed model.

Ground Crew Rostering for the Airport Check-In Counter

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The construction of ground crew rosters for the airport check-in counters that satisfies all rostering constraints is a complex problem. The rostering problem involves the decision of check-in counters to be opened and shift allocation of crew member over a roster period. In this paper the problem is described based on the summary of the demand characteristics and a linear programming model is built over a specific time window. The proposed model is verified by a case study where the results illustrated the superiority of the performance in terms of less open counters and decreased shift working hours.

The Effect of Soft Power Investment on Shanghai Port Competitiveness Using DEA

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In order to improve the overall performance of Shanghai port, this paper proposes a systematic evaluation model to assess the competitiveness of Shanghai Port with 25 input indicators and 6 output indicators. The proposed evaluation model reduces the dimensions of the indices by Factor Analysis, and uses the data envelopment analysis (DEA) approach to validate the data from 2008 to 2013. By implementing the cross-evaluation mechanism after the analysis of factor deviation, this paper is capable to recognize the pros and cons of each decision-making unit (DMU), and provide practical implications for enhancing the competitiveness of Shanghai Port.

Performance Improvement of Oil and Gas Industry via Lean Concept: A Case Study from Valves Requisition

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The oil and gas (O&G) industry utilizes engineering contractors (ECs) to perform analysis, evaluations and recommendations. The ambition of ECs is to create value for the O&G operators by minimizing the waste. Inherently, the ECs' organization operates in project mode. Due to the frequently changing nature of: operators' requirements; suppliers' and/or manufacturers capabilities and restrictions; and lack of standardization in documentation as well as work processes (i.e. due to different engineering projects' demands) the anticipated performance is jeopardized. The aforementioned inhibits the progress of the engineering projects, resulting in delays in delivery and causing significant losses to the operators as well as fines (and loss of goodwill) to the ECs. This manuscript illustrates a case study to demonstrate the possibility of performance improvement in the valves requisition process (VRP) in a contractor organization utilizing the lean concept. The case study deploys the value stream mapping (VSM) approach to investigate the under performing activities in the VRP using a current state map (CSM). Finally, it proposes a future state map (FSM) with the possible improvements in projects' performance.

Session	Engineering Education and Training
Date	8/12/2015
Time	13:30 - 15:30
Room	MR334
Chairs	Chien-Sing Lee, James K. C. Chen

Creation of a Mentoring Program for Improving the Education of Industrial Engineers

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This document aims to present the creation of a mentoring program to be applied in developing industrial engineers students, while interns at the companies, into future junior industrial engineers. Its objective is to contribute to a better professional performance as engineers. It is a case-study for the RIP region (including the cities of Resende, Itatiaia and Porto Real), which is located in an industrial area in Rio de Janeiro State, in Brazil, better preparing the new junior engineers for the labor market. This study is still under development. The PDCA cycle was used as a base method to create the program, since this was developed in 4 semesters at the university. As a draft result, which needs to be confirmed, 87% of mentors and mentees approved the program as efficient, based on initial targets.

Knowledge Loss at Institute of Higher Learnings in Technologies in India

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Institute of Higher Learning in Technologies (IHLTs) in India suffers from sufficient number of quality technical institutes and competent academic staff, which is difficult to remove. Knowledge retention is becoming a main challenge in most of the technical institutes across the globe, as knowledge has become a main asset of organizations. Moreover, prevention of "knowledge loss" enables a technical institute in better knowledge transfer thereby providing quality education to its students. The research questions in this study are how IHLTs can minimize the loss of important knowledge while experiencing high levels of retiree? The result reveals that special care must be dedicated throughout the process to: retaining best practices and unexpected situations; knowledge sharing, educating the Top management of a technical institute about the importance of KM practice and thereby reducing knowledge loss.

Educating Tomorrows Engineers: Reinforcing Engineering Concepts Through Virtual Reality (VR) Teaching Aid

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The research focuses on the practicality of applying Virtual Reality (VR) as tool for conveying engineering concepts to first year engineering students. It does this by presenting a VR platform aimed at achieving a simplified methodology for depicting and analyzing facility layout and production process. Current reality shows that Higher Education Institutions (HEI's) are towing the electronic teaching path and more practical concepts are delivered to learners, using digital e-learning simulation tools. Equally, HEI's are adopting dynamic models for virtual interaction with students, globally, via e-classrooms and VR platforms. The article presents the developed teaching tool and validation method for conveying factory layout optimization concepts and production process model, through a partially-immersive VR design platform, developed using 3D Studio Max and complementary high-level applications. The developed teaching aid has an interactive user interface through which the building framework, sections and prototype schema of the industrial process may be visually analyzed.

Systems Thinking - Innate or Learned? Recent Study Findings

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To perform successfully interdisciplinary engineering tasks, engineers need a systems view, in other words, a high capacity for engineering systems thinking (CEST). Systems thinking is a major high-order thinking skill that enables individuals to successfully perform systems engineering tasks. Industrial engineers who work in complex, multi-dimensional and multi-disciplinary reality need to view systems in a holistic manner or in another words need to implement systems thinking. In the current study we identified the factors that influence the development of systems thinking among engineers and found ways to encourage this development. Moreover, we presented specific personality types that tend to naturally use the Systems Thinking approach. According to the study findings, Systems Thinking is most likely a combination of innate talent and acquired experience.

A Framework for Human Collaborative Robots, Operations in South African Automotive Industry

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In this paper we investigate the future of human collaborative robots within the South African automotive industry. Human robot collaborative work has the potential to advance quality, efficiency and safety in manufacturing. The global automotive industry is constantly restructuring to yield the best out of its production, hence the labour force in South Africa has to adjust and prepare for the upcoming future of collaborative robots interaction. This Research will aim to address the issues concerned with the implementation of this innovation. Is South Africa capable of executing this innovation? We investigate the standardization essential to restructuring the automotive plants to accommodate these changes and develop skills and training to assist the labour force to be able to interact with the robots and increase productivity. Furthermore we investigate the key issues around the human collaborative robots interaction.

The Study on Competency Characteristic of JAVA Software Engineer of the Internet Enterprise

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Through three Internet software company 40 people were Behavioral Event Interview (BEI), the establishment of a discriminative Competency Model Java software engineers that companies need innovation and strong emphasis on interpersonal communication, customer service-oriented software developer, interpersonal communication, customer service orientation and innovation will become the core of Internet software companies, a senior software development engineer competency. This model will help enterprises to standardize the employment needs of Internet software to reconstruct the employment strategy, by building a model of talent to build organizational capacity to the business of the employer, selection, training and development and even provide a theoretical basis for performance assessment, evaluation methods and tools.

Studying the Continuance Intention and Success Factor of E-Learning Systems

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E-learning is facing large amount adoption and speed up growth on long distance learning. This study aims to examine continuance intention and success factors of E-learning systems. The scope of research is focused on educational purpose not including corporate training program. The results shows that service innovation, information quality, and system quality was the key factors of E-learning systems. These factors can helps the learner achieve better performance which enabling the users continuance intention using it. The findings offer to enrich system providers and instructors perspective as well as practical implication in developing successful E-learning systems.

Study on Technological Innovation Efficiency Based on Dea-Malmquist: Empirical Analysis of 15 Chinese Listed Pharmaceutical Manufacturing Firms

Zhongyuan Xu, Wei Chen
Harbin Engineering University, China

This paper makes empirical analysis on technological innovation efficiency of 15 Chinese listed pharmaceutical manufacturing firms between 2012 and 2014, by DEA-Malmquist. The results show technological changeable efficiency and resource changeable efficiency of Chinese pharmaceutical manufacturing industry, and indicate the main factors influencing technological innovation of Chinese pharmaceutical manufacturing firms. Then it can provide advices in theory and practice methods.

Patent Survival Analysis of China's Communication Industry

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Based on China's patent data of communication industry from 1985 to 2009, and using the term of patent right as the measurement of patent quality, this paper presents a survival function of patent maintenance in China and stratified cox regression model. It makes a comparison study in terms of four aspects: the quality of domestic and foreign patent applicants, different technical fields, different types of Chinese applicants and different time periods.. The result shows that there is a large gap in patent quality between domestic and foreign patent applicant. With regard to technical fields, there is important difference. Among all the Chinese applicants, patents filed by firms command higher quality; those by individual possess lower quality, but not lower than those filed by research institutions. About time periods, it is no doubt that patent quantity is much better in later than in previous years.

Strategy Framework for Technology Platforms within the Context of Diversified Companies

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The significance of technology platforms as interconnected networks of technological knowledge is continually growing in diversified companies. The reason is that technology platforms support diversified companies to handle the conflicting priorities of fulfilling the customer demand for individualized innovations, while generating company-wide technological synergies. Hence, the success of diversified companies can be affected to a significant extent by the implementation of technology platforms and a consistent strategy framework that enables the description of technology platform strategies. In practice however, a low degree of systematization regarding the description of technology platforms and their strategies is noticeable. This is due to the fact that there is no established opinion about a strategy framework, which supports the description of technology platform strategies. Therefore, in this paper we develop a model that characterizes a strategy framework for technology platforms in diversified companies, in order to describe sustainable strategies for technology platforms.

Research of Continue Using Behavior of Electronic Knowledge Repositories Basing on a Comprehensive Model

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Based on Expectation-Confirmation Model (ECM) and Commitment-Based Model, a comprehensive model was established to study the electronic knowledge repositories (EKRs) continue using (continuance) behavior. The results suggests that: (1) Emotional commitment, satisfaction, calculative commitment and perceived usefulness are positively associated with EKRs continuance behavior; (2) The positive influence of expect confirmation, emotional commitment and perceived usefulness on satisfaction are confirmed ;(3)Expect commitment has a positive influence on perceived usefulness; (4) Moral commitment does not exhibit a positive influence on satisfaction and EKRs continuance behavior, the influence of calculative commitment on satisfaction isn't verified.

Engineer-to-Order Companies are Reserved on Adoption of Current Engineering Trends – An Empirical Study

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The ability to identify trends is vital for engineer-to-order companies in order to remain competitive and to enable an early response to changes. However engineering trends have either been described from a primarily theoretical point of view or the focus lied on a detailed description of single trends. This contribution identifies 12 general trends in engineering based on a literature review. It also provides practical insight by means of an internet survey with industrial practitioners. The survey focuses on the practical potential of the identified trends and assesses which methods, processes, IT-systems and business models are implemented by companies to react on the trends. The results show that the majority of the trends have high potential and significant impact on engineering processes. However, companies only sporadically implement corresponding measures to react on these trends. Especially measures which require high change and integration efforts have a low degree of implementation in industrial practice.

The Prospects of Panel Style Nano-Battery Technology for EV/HEV

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CO2 reduction is a fundamental driver for lightweight in automotive. Reducing weight of automobile helps improve energy consumption and reduction of CO2 emission. It is estimated that if the weight of automobile can reduced by 100 kg, it saves approximately 8.5 g of CO2 per 100 km travelling.The introduction of EVs is one of the initiatives for the reduction of CO2 emission. This paper presents the prospects of panel style nano-battery technology for EV/HEV builds with CuO filler epoxy resin (ER) sandwiched by Carbon Fiber (CF) and Lithium (Li) plate. The proposed body panel of EV/HEV would reduce the car weight about 20%, contribute on electrical energy storing and releasing capacity of 1.5 kWh (10% of car total power requirement), and CuO filler ER provides the heat insulation for the car which would save about 10% power consumption of air conditioning system. Aluminum laminated polypropylene film has considered with the propsed body panel to prevent EMC effect to the passenger cabin. It is expected that the proposed panel style nano-battery of EV would save 6.00 kWh battery energy equivalent to 2.81 litre of petrol and prevent 3.081 kg of CO2 emission for every 100 km travelling.

The Role of Universities in Fostering Knowledge-Intensive Start-Ups -According to German Experiences-

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Academic spin-offs belong to a special form of technology transfer through research institutions and generate sustainable positive economic effects. They ensure that developed ideas can be transformed into marketable products much faster and create better market opportunities. They become an essential role in the competitiveness of developed economies. The Federal Government of Germany has established a broad supporting program for spin-offs from public research institutions in recent years. In 1997, the EXIST program started with the aim of activating entrepreneurial thought and action, supporting spin-offs and improving the start-up climate at Germany's universities and non-university research institutes. Thus, the quantity and success of young technology-oriented and knowledge-based businesses should be increased. This paper shows the economic relevance of academic spin-offs and describes the public support program of the Federal Republic of Germany enhancing knowledge-based spin-offs.

Effect of Domestic and Foreign Technological Collaborations on Different Level of Product Innovation Radicalness

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Based on a sample of 1,684 manufacturing companies from the Taiwanese Technological Innovation Survey for the period from 2004-2006, the paper examines the relationship between different types of domestic and foreign based collaborative partners and different levels of product innovation radicalness. A complex network of relationships emerges where the level of innovation radicalness is associated with the type and geographic location of partners. A firm that aims to develop radical innovations should consider collaborating with domestic universities and competitors but also with customers in foreign countries.

ERP Pre-Implementation Framework for Higher Education Institution: A Case Study in Purdue University

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The costs associated with higher education continue to increase placing even great emphasis on the need to understand and control costs. In response to these needs, many Higher Education Institutions (HEIs) are adopting business management models, processes and technologies. With the increased business activities at HEIs, Enterprise Resource Planning (ERP) vendors recognized this new market opportunity and quickly moved in to recommend business solutions. Purdue University began implementation of SAP, one of ERP softwares, in 2005. OnePurdue is one of the first universities to adopt SAP as the solution to enhance its growth, improve services and increase collaboration between departments. This study will focus on the OnePurdue – SAP software pre-implementation phase. The study will provide a framework for ERP system pre-implementationin a higher education institution.

Necessity of the Consideration of Strategic Aspects in Variant Decisions of Modular Product Architectures

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The trend of today's companies to reverse the threat of an increasing complexity, resulting from globalization effects, customer requests for individualization or shorter product life cycles, by a modular product architecture, can be observed more and more often. However, the concept of an alternative type of product structuring is novelty for many businesses. The risk of a recurring upsurge in complexity, when refining the implemented modular product architecture is high. This is due to an insufficiently planned and executed reutilization of the existing and newly developed modules and module variants. The solution is the early consideration of all relevant strategic aspects on module or module variant decisions. Therefore, an approach to collect these strategies and to visualize them in the strategy-contribution-map has been developed and tested at Bosch Thermotechnology. Additionally, the subsequent deployment of this method is presented and discussed.

How Much is Too Much – Equilibrium Points for Good Export and R&D Intensity: Data of World Top 2000 Companies

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Dynamic capabilities, as vehicles to cope with environmental changes, have become extremely popular due to constantly high environmental turbulence. There exist wide variety of capabilities, two most popular ones in globalized and fast changing world are R&D and export. From exploration-exploitation perspective of company, both capabilities have explorative tendencies, interdependent to each-other and fighting for the same resources – can they successfully co-exist? Data from the world top 2000 companies ‑ including Shell, Samsung and Johnson & Johnson – provide evidence for successful ambidexterity of capabilities. As an interesting outcome, both capabilities independently have own equilibrium point for successful operation. Findings indicate that top companies' equilibrium point for export intensity is around 61% and for R&D intensity around 30%.

Are Older Adults Really That Different? Some Insights from Gerontechnology

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Gerontechnology is a promising area of research. This study aims to extend knowledge in the area by providing an effective targeting strategy for gerontechnologies. Using near field communication (NFC)–enabled technology in the form of NFC light system (NLS), the study exposes a sample of older adults to this form of gerontechnology and examines their ease-of-use and usefulness evaluations of NLS and the subsequent impacts of these evaluations on their intentions to use NLS. Given a resulting scenario in which older adults considered NLS easy to use and useful, the study investigates whether demographic, psychographic, and behavioral characteristics produce any differences in their intentions to use NLS. The results reveal that older adults do not differ in their intentions to use NLS when demographics and psychographics are considered. Instead, older adults with positive attitudes toward NLS are more likely to use NLS than those with negative attitudes toward NLS. Thus, these findings suggest that an undifferentiated targeting strategy should be used for gerontechnologies, especially NFC-enabled technology, such as NLS, and that further research should concentrate on eliciting positive attitudes among older adults to persuade desired behaviors, such as greater intention to use and actual use of gerontechnologies.

Sustainable Innovation: A Consumer Perspective

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In order for innovation to become sustainable, consumers need to actually purchase innovative products and services, even when these happen to be expensive. For these cases, this study addresses a gap in the literature by developing the concept of sustainable consumer innovativeness and by seeking to understand its determinants across countries. Based on data collected from more than 3,000 consumers across five countries, this study finds that sustainable consumer innovativeness tends to be influenced negatively by female sex and savings orientation, whereas it appears to be influenced positively by income satisfaction, financial expectations, curiosity, uncertainty avoidance, and status importance. It does not seem to depend on age. While most of these effects are generally valid, their magnitude tends to differ by country. These results may enable managers of innovative firms to identify lead users and thus to improve marketing strategy during the launch phase of innovative products and services.

A Study on Flight Combination in Terms of Timed Stochastic-Flow Network

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The highly competitive airline market speeds up the needs in airline alliance or flight combination to cost down the operation as well as to enlarge the market share. However, the low reliability in some flight combinations may discourage the customer to buy such products. This paper proposes a method to evaluate the reliability of flight combination in terms of timed stochastic-flow network. A stochastic-flow network (SFN) is a network whose flow has stochastic behavior or probabilistic multi-states. A timed stochastic-flow network (TSFN) is a SFN whose flow spends time to go through the network. Through this new model some undiscovered flight combinations may be found out, and some unreliable flight combinations can be inspected. A numerical example is presented for the explanation of the proposed method.

The Quality Function Deployment (QFD) – Based Evaluation of Malang Waste Bank Management

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Malang is one of the big cities in Indonesia in which its number of citizens is growing every year and the amount of waste which is also increasing. One of attempts to overcome this problem is the establishment of Malang Waste Bank (B.S.M.). The Quality Function Deployment with House of Quality approach is implemented for the evaluation in this study. Data are collected by distributing survey questionnaires to customers and by interviewing the B.S.M. to obtain information about the current state of the B.S.M.. Based on the questionnaire's result, the five points of Voice of Customer obtained. The relationship assessment between VoC and technical response conclude the most powerful influences toward customer's satisfactions. Thus, further researches regarding them are required to meet B.S.M.'s customer's needs, to attract more people to become the customers, and to succeed the B.S.M. program.

Performance Based Contracting for the Manufacturing Industry by Using Integrated Platform and Dynamic Pricing Model

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Although Performance Based Contracting (PBC) concept is not totally new, PBC adaptation in Industrial Machinery and Components (IMC) manufacturing, which produces high-value and long life machineries, is rather slow and done with extra caution. Three main concerns for manufacturers to implement PBC are the investment cost, the maintenance cost and a possible revenue loss. To handle these concerns and accelerate the PBC implementation, we propose an integrated platform that consists of three components: dynamic pricing, sensor data feeding and machinery monitoring. Further focusing on the first component, we model the dynamic pricing as an optimization problem and propose Genetic Algorithm to solve the problem. We run experiment on generated data and show that GA gives a good pricing solution with average difference of 5.64% from the traditional fixed leasing price.

Comparison of IT Services Organizational Units on the basis of Human Capital Measures

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In this paper, we compare organizational units using Data Envelopment Analysis (DEA) on the basis of Human Capital (HC) measures. HC based performance measurement has become an important aspect for organizations to sustain long-term growth. With the inclusion of HC measures, the variable selection for DEA model becomes challenging. We propose an automated model discovery method for variable selection. The guideline for variable selection is based on the information obtained from the executives about the variables. This information about the variables could be complete, partial or incomplete. We demonstrate our method under these various scenarios. The methodology is applied to compare 40 units of an IT service firm. Further, we discuss in detail the managerial insights for improvement of the inefficient units.

Green Supply Chain Management, Triple Bottom Line, and Organizational Theory – Prioritization with Fuzzy AHP Method

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The purpose of this study is to investigate the impacts of green supply chain management (GSCM) practices on triple bottom line (TBL) measures. Fuzzy AHP is employed to reveal a relative weight of importance of each GSCM practice on TBL measures, based on inputs from twenty experts from electronic parts and component manufacturing industry. Furthermore, this study provides prioritization of enabling factors in implementing GSCM strategy from three prominent organizational theories: (i) institutional theory, (ii) resource-based view theory, and (iii) social network theory. GSCM adoption in Thai electronic industry is best explained by organization theory, where laws and regulations are the most influential factors encouraging GSCM implementation. The research study, based on findings enables recommendations for management team to allocate necessary resources in effective strategic GSCM implementations and evaluations.

A Model to Evaluate Risk Propagation Considering Effect of Dynamic Risk Information Sharing and Multi-Sourcing in Supply Chain Networks

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The cost-optimal trend in global competitive environment has led to lean, complex and consequently vulnerable supply chains. This vulnerability is high due to the presence of increasing dependency in lean supply chain networks. Hence, it is essential for companies to regulate the supply chain network structure and information sharing strategies so as to be more resilient to disruptions/risks. In order to achieve this objective, it is imminent to analyze as to how best to quantify and examine the robustness of their supply chain networks under disruptions.

Here, we propose an analytical model to assist companies to evaluate dynamic risk propagation and quantify likely disruption loss in supply chain networks with the consideration of the effect of multiple sourcing and information sharing on risk propagation. Mean loss and Value at risk (VaR) is employed to quantify the potential loss due to disruptions.

Waste Reduction of Returnable Packaging: A Case Study of Reverse Logistics in an Auto Parts Company

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The objective of this research is to study and reduce waste of reverse logistics in an auto parts company. The result of this study shows that the main problem of packaging waste for packing auto parts used to transport among 3 countries is high. The studying start from collecting data that need for waste analyzing such as export costs of auto parts, packaging cost and export statistic of 2014. The new improvement result by change material of packaging from disposable to be returnable and propose new logistics model including Single trip and Round trip shows that the export packaging waste can be reduced by 65%.

A Solution Procedure based on Lagrangian Relaxation for Supply Chain Planning Problem with CSR Investment

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In this paper, we consider a supply chain planning problem for a single manufacturer with corporate social responsibility (CSR) investment decision under demand uncertainty. The activity of CSR is modeled as the investment to customers. In the mathematical model, we assume that the average demand increases if the investment of CSR is increased. The objective function is the total profit including the piecewise linear investment costs. The supply chain planning problem is formulated as a mixed integer nonlinear programming problem. An efficient solution procedure based on Lagrangian relaxation is developed. The effectiveness of the proposed method is confirmed from computational experiments.

The Governance of Cloud Based Supply Chain Collaborations

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Despite of the promising benefits of cloud computing in enabling efficient, sustainable and agile Supply Chain Collaborations (SCCs), this service does not eliminate governance challenges in SCCs. Cloud based SCCs may flounder without a proper understanding of how to govern inter-organizational relations and insight into how the cloud service will affect it. Using a case study method, this study aims to: (1) observe cloud based SCCs in practice and (2) get an overview of current governance models that exist for cloud based SCCs. Five types of company roles in cloud based SCCs are proposed to reduce ambiguity in inter-organizational communication. Using this classification, this study introduces market and shared governance for cloud based SCCs besides the hierarchical governance, Network Administrative Organization. This study's contribution is to describe how cloud is currently used to enable diversity of the SCCs' governance models.

Mitigating Risks in the Sourcing of Transportation Services: A Real Option-Based Approach

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This present paper focuses on the mitigation of uncertainty-driven cost increases specific to the sourcing of transportation services, impacted by spot price volatility, uncertainty of demand and unreliability of carriers. We investigate the value of a specific mitigation strategy, namely the possibility to contract an alternative carrier (AC), which would take care of extra/emergency shipments, at a fixed agreed price, instead of a volatile spot price from freight auctions (FA). We develop a computational model that supports decision makers in assessing the value of this AC strategy compared to FA, in order to see which strategy is more effective and efficient. The model will also guide the decision maker in defining the fair price to be paid to the AC. The computational model is applied to a numerical example, thus showing its value in supporting managers in charge of sourcing the transportation services in the presence of risk and uncertainty.

Risk Assessment Method for Cybersecurity of Cyber-Physical Systems Based on Inter-Dependency of Vulnerabilities

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As cyber physical systems are used more extensively and thoroughly, cyber-attacks have become one of the utmost threats to the cybersecurity of cyber physical systems (CPS). It is possible that an adversary can damage a physical component with cyber-attacks (eg. The Stuxnet). Although many research has been done on risk assessment method, limited work has been published to quantify cybersecurity risk of CPS. This paper suggests a method to quantify the cybersecurity risk of CPS caused by cyber-attacks in terms of numeric value. To help quantitatively measure the risk, we present two indices, the successful-attack-probability index and the attack-impact index, based on vulnerability dependency graph. Furthermore, the successful-attack-probability index is calculated considering the interdependent relationship between vulnerabilities and the calculation of attack-impact index takes the impact on the physical domain resulting from cyber-attacks into account. Numerical example shows that the potential risk of system and the optimal attack target can be obtained. The proposed method can be extended to security investment analysis as well.

Performance-Based Risk Management Systems (PBRMS) in the Arctic Drilling Waste Handling Operation

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As the concerns about the potential environmental impacts of the drilling wastes heighten in the Arctic, the environmental controls have been tightened by regulatory authorities. Hence, forecasts of environmental and health risks, associated with the drilling wastes, can provide the vital information's needed for the sustainable resource development decisions. The aim of this paper is to foster an integrated interdisciplinary understanding of technical and operational risks associated with drilling wastes and their management by implementing the performance-based risk regime. The paper critically examines the role of performance-based risk assessment in drilling waste management by scrutinising the methods used, as well as the underlying theories and assumptions. Furthermore, the paper studies the risk factors involved throughout the logistical chain of handling of drilling wastes in the Arctic region.

The Improved Methodology of Safety Assessment with System Simulation

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The paper aims to present an improved methodology of safety assessment with system simulation. In this paper, the Monte Carlo simulation and uncertainty analysis will be applied to the research of FMECA which is the basis of safety assessment. The improved methodology will overcome the shortages of traditional method. At the same time, the idea of the method will provide a comprehensive safety analysis of the system. At last of the paper, an application case about the safety assessment of the control system in unmanned aerial vehicle (UAV) will be set up as typical example to demonstrate the application of the methodology.

Improved Condition Monitoring System to Protect Railway Axle Bearing Safety from Electric Corrosion

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Axle bearing is a critical machine element in the railway system to the operation reliability and safety in the transportation. The failure of the axle bearing can lead to derailment. In order to assure the transportation safety, this paper discusses the cause of the axel bearing failure, and proposes the counter measurement to reduce the risk. Due to the failure of previous implemented counter-measurement, this paper suggest implementing the condition monitoring system to monitor the axle bearing, aiming to confine the bearing failure in control. In order to improve the failure diagnosis accuracy, this paper suggests collecting signal from various perspectives, for example, vibration, current, voltage, temperature etc. on the axle bearing for the condition monitoring system. The various signals should be analysed by using physical model and data driven model, for the maintenance policy optimization.

Extreme Waves Generated in a Future Arctic Ocean

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The Arctic Ocean is widely claimed to be an unpredictable environment. In this paper, we examine this characterization from a coastal engineering point of view.

Believing that one reason that makes the Arctic environment unpredictable is the annual decreasing percentage of permanent ice, we have focused on consequences for the design wave height in a case of an open Arctic sea during the fall season. Assuming that the wind conditions are almost the same as to day, we have calculated the generated waves for the longest possible fetches and have compared those results to the wave height estimates that are given today.

The results show a significant change in the characteristic wave heights. Those changes will dramatically influence the coasts by accelerating erosion effects but also any offshore operations that already exist in Arctic seas, putting human lives in danger.

Life Assessment of Organic Coating Based on Accelerated Degradation Test and Modeling

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The protective properties of organic coatings for internal applications of plane cabin are generally evaluated by means of accelerated degradation laboratory tests, including electrochemical techniques. The coatings are stressed by different mechanical, chemical, thermal loads and the effects on the protective properties can be measured by using well established electrochemical techniques, like electrochemical impedance spectroscopy, Insulation resistance, etc. An absence of concerned question is how to estimate the life of organic coatings of panel and therefore determine the repair period. The coatings were tested in the laboratory using electrochemical impedance spectroscopy, in order to quantify the damage, after accelerated degradation test. The test data are then used to fit degradation paths by linear regression models. Extrapolation to the failure threshold allows the prediction of the Time-to-Failure of coating. Finally, the reliable lifetime of the coating is predicted by an accelerated degradation model.

Assessing the Benefits of the Product Postponement Strategy to Mitigate Supply Chain Risks: A Real Options-Based Computational Model

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The purpose of this paper is to develop a model for the quantification of the costs and benefits associated to a specific supply chain risk management strategy, namely the product postponement strategy (PP). To do this we adopt a real option-based approach and apply the model to a numerical example. The application will show the usefulness of the model in supporting the managers' decision making process on assessing the probabilistic advantages of adopting the PP in risky environments, specifically under conditions of demand and supply disruption.

A Taxonomy of Integrative Technologies

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This paper describes the development and analysis of a numerical alternative taxonomy of integrative technologies. Based on this research's purpose, four clusters are identified, as follows: communication and organization integration improvement, negative integration improvement, positive integration improvement, and manufacturing process standardization improvement. The taxonomy approach was the main methodology in this study. Empirical data from the International Manufacturing Strategy Survey (IMSS) were used to test this research question.

The Mechanism of China Textile Industry Shift: Strategies and Behaviors of Buyers and Suppliers

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This paper employs a perspective of company behavior to analyze the China textile industry shift. In order to maximize profits, international buyers procure products in the global textile network. The sourcing strategy affects behaviors of enterprises in the supply chain. Questionnaire surveys and interviews are conducted to figure out the influence factors of the international buyers' sourcing strategy. It appears that "cost" is the most important factors. Furthermore, several external indicators such as "political environment", "import procedures and channels" etc., are vital in selecting the original countries. Regarding to the selection of suppliers, "price", "quality" and "quick response and lead time" are regarded as the key determinants. The competitiveness of Chinese suppliers is also proposed in the paper.

Service Oriented Architecture Led Producer Centric Supply Chain: Learning in Indian Context

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Study on Supply Chain Management provides insights to the underlying philosophy of bringing together various agents for its sustenance. Dairy sector in India, despite being the largest milk procuring country in the world, faces enormous challenges in managing sustainable supply chains. One of the problems critical to dairy sector is to bind the dairy producers in the supply chain. In order to manage this complex task it is argued that effective supply chain with milk producer centric service orientation will be necessary. This paper develops a conceptual model and discusses various metrics based measurements to support this argument in Indian scenario.

Quantifying Disruptions Propagation in a Supply Chain

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Today's supply chain (SC) is highly complex and inter-connected so disruption at one company can propagate to other companies in an unexpected manner. However, most approaches in the area of risk management provide only static analysis of the SC risk but not the propagation of disruption through the SC network. Thus, in this paper, we propose a time-based model that quantifies the magnitude of the propagation based on the concept of water ripples. The proposed time based model quantifies the disruption caused by both supply and demand in terms of time and intensity.

Supply Chain Management Information Systems and Organisational Performance in Economic Turbulent Environments

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Supply Chain Information Systems (SCIS) and their impact on organisational performance has been studied by a number of studies. This research seeks to extend this body of knowledge by adopting a fresh lens to explore empirically the relationship between organisational performance and SCIS in circumstances of economic downturn and financial turbulence. The statistical relationship between Supply Chain Informat ion Systems' (SCIS) 'Effectiveness' and 'Organisational Performance' is tested and measured by financial and non-financial variables. So, even though complexities associated with measuring SCIS efficiency and Organisational Performance continue to dominate research discussions, these are somewhat limited to just explaining the phenomenon without addressing the misalignment of the information provided by SCIS, business expectations and Organisational Performance. In consequence, this paper reports findings from a large survey of 168 SCIS managers in Greek SMEs where, even during economic downturn, a strong correlation between SCIS and non-financial Organisational Performance is evidenced. In considering the findings, this study proposes guidance to enhance SCIS Effectiveness and Organisational Performance.

Selection of Supplier Portfolio in the Presence of Operational Risk and Disruption Risk

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In a make-to-order environment, manufactures should make preparations for production to fulfill stochastic customers' demand at low costs and risk levels. This research focuses on two risk levels: operational risks and disruption risks. Value-at-risk (VaR) is used to measure operational risks which have high frequency but low damage, while conditional value-at-risk (CVaR) is used to evaluate disruption risks that don't happen frequently but may cause significant damage. A mixed integer programming model is presented to incorporate these hybrid risks with conventional criteria. The proposed GA-based approach is able to balance these objectives during supplier portfolio selection and order allocation. Finally, computational examples are presented to illustrate how the decision is made.

A Genetic Algorithm Based Solution for the Online Cutting Problem with Defects

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In flat glass production, glass products of various sizes and quality classes are cut from a continuously moving glass ribbon. If a product is placed on a part of the glass ribbon that has more defects than allowed by that product's quality class, it is discarded as scrap. Scrap glass is sent back to the furnace to be recycled. This process creates additional production costs and reduces the productivity of the line. Therefore, the main objective of the cutting process is the minimization of scrap glass. In this study, we propose an online solution approach that uses a look-ahead mechanism to make cutting decisions in real time. This approach solves a series of static cutting problems over a rolling horizon using a genetic algorithm. The proposed approach has been tested successfully on realistic problem instances that are based on parameters of contemporary glass production lines.

Agent Based Modeling in Factory Planning and Process Control

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Nowadays the need for autonomous distributed manufacturing systems is increasing. Due to the rapid change of technology and the need of more customer oriented products, manufacturing systems need to be more dynamic. In the past few years, Agent Based Modules (ABM) were introduced to optimize autonomous distributed systems as well as for process control. In this paper we review the literature addressing ABM in manufacturing strategy and dynamic process control between 2009 and 2015 to provide an up-to-date picture of the role of ABM to solve such problems and its efficiency as well as its future challenges.

Intelligent Fixture Structure Design Based on Knowledge Ontology

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Fixture configuration is an important stage in the whole fixture design process. Because of the complexity in fixture elements selection and assembling the selected as an entire fixture, it is still a challenge to improve the efficiency of the fixture configuration. By knowledge ontology modeling this paper presents a new methodology for fixture configuration. Firstly, the ontology models of fixture and workpiece are given to represent them respectively. Secondly, combined with the rule-based reasoning (RBR), the case-based reasoning (CBR) and the analytic hierarchy process (AHP), an intelligent fixture selection method is proposed to get the suitable fixture by matching corresponding entities of fixture ontology and workpiece ontology. Then a parameter driven method is used to get fixture and its elements geometry and an automatic assemble method for assembling those elements to an entire fixture. Finally, the modeling, method and system are tested and verified by conducting a typical case.

A New Multi-Objective Scheduling Problem on Batch Parallel Machines with Maximum Allowable Incompatibility for Jobs

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Science development and industry progress motivate researchers to solve the problems of the real world. This paper presents a new multi-objective mathematical model on identical batch processors arranged in parallel in order to minimize three objective functions including time, cost and jobs incompatibility simultaneously. The concept of jobs incompatibility used to classify the previous studies can be considered in many different ways. Since the jobs have been divided into compatible or incompatible ones, we should consider a certain parameter (i.e., maximum allowable incompatibility of each job), then jobs are assigned into batches by observing the relative constraints. Because of its impact on other functions, we express it as a new objective. The presented model is solved for a small-sized problem by the Îμ-constraint â€Śapproach coded in GAMS software. By using the data envelope analysis (DEA) method, the most efficient optimal-Pareto solution is determined among all Pareto solutions.

LP-Relaxation-Simulated Annealing Manpower Scheduling Algorithm for Service Industry

Hendra Teja Wirawan, Ping Chong Chua
Singapore Institute of Manufacturing Technology, Singapore

In the increasingly competitive service industry, utilization of precious manpower resources can make the difference in terms of profitability or even survivability. Current scheduling methods and solutions are designed to suit particular case or class of problems; in which significant modification are often required when they are to be applied to different class of problems. In this paper, a general manpower scheduling model with flexible algorithm to provide consistent near optimal solution is proposed. The general set covering model is able to cater for overtime works, part time workers, flexible shift length, and multi-skilled workers; whereas the algorithm based on LP-relaxation and simulated annealing was consistently giving ~1% deviation from optimal solution, based on computational experiment on various distribution pattern of required staffing level with increasing complexity and problem size.

Feature Model Augmentation with Sentiment Analysis for Product Line Planning

Feng Zhou, Roger Jiao
Georgia Institute of Technology, United States

A feature model helps to discover commonality and variability within a product family, helping stakeholders configure product lines and identify opportunities for reuse. However, no direct customer preference information is incorporated in the feature model when it comes to the question—how many product variants are needed in order to satisfy individual customer needs. This paper proposes to mine customer preference information for individual product features by sentiment analysis of online product reviews. The features commented by the users of a product are used to augment a simple feature model predefined with customer opinionated preference information. In such a way, the customer preference information is considered as one attribute of the features in the model, helping designers make informed decisions when trading off between commonality and variability of a product line. A case study of Kindle Fire HD tablets is used to illustrate the potential and feasibility of the proposed method.

Identification of Critical Success Factors for Emerging Market Entry Planning Processes in the Automotive Industry

Thillai Sivakumaran[1], Florian Köhne[2], Michael Toth[3]
[1]Technical University of Dortmund, Germany
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[3]Bochum University of Applied Sciences, Germany

The sales potentials for automotive companies in Europe are decreasing and emerging markets, such as the BRIC-states or the ASEAN countries, are in the focus of European automobile manufacturer's attention. However, the OEMs have to face different challenges in the market development process of these high potential markets. Car manufacturers and suppliers struggle with the decision of following a local manufacturing strategy and the related set up of regional supply chain networks or following complex knocked-down production strategies. But the decision finding process shows different deficits. Especially the heterogeneous market situations and differentially developed local industries require a deep market and manufacturing footprint analysis. This paper focuses on the identification of critical success factors of emerging market entry planning processes in the automotive industry. Through literature review and expert interviews the main critical success factors in this context were identified and operationalized through adequate key performance indicators.

A Behavioral Choice Model for Product Demand Estimation

Shuli Wu, Songlin Chen
Nanyang Technological University, Singapore

Traditional choice models assume that consumers have well-defined preferences and are not influenced by additional information. However, consumers do not always behave rationally in making purchase decisions. This paper reports the development of a behavioral choice model that covers reference dependence, diminishing sensitivity and loss aversion in assigning value to each product attribute. The utility of a product is formulated as a weighted sum of all interested attribute values and an unobserved noise factor. A choice probability is then derived from the utility function under the first choice rule with the assumption that unobserved factors are independently identically distributed extreme values. A case study is conducted and the behavioral choice model is demonstrated to outperform logit choice model with smaller squared error for predicting product demand.

Research on IoT Based Cyber Physical System for Industrial Big Data Analytics

Carman Ka Man Lee, Charlie Yeung, Meina Cheng
The Hong Kong Polytechnic University, Hong Kong SAR

This purpose of this paper is to provide a comprehensive solution for industry through research and development of an Internet of Things (IoT) based Cyber Physical System for Industrial Informatics Analytics with the following objectives. This study conduct a review regarding big data analytics in industry and design a physical cyber system with the integration of various existing and proprietary data analytics systems based on their business needs so that the modules can be reconfigurable and interchangeable. The paper designs a new context intelligence framework to handle industrial informatics regarding location, sensor and unstructured data for big data mining. A case example will be shown to demonstrate the concept of the proposed physical cyber system. Further study on system integration and migration from existing factory to smart factory should be conducted so as to realize the next industrial paradigm shift.

Simulation of Fire Evacuation in a High-Rise Office Building

Bai Wen, Huo Yan, Zou Gaowan, Gao Ye
Harbin Engineering University, China

In order to find out the evacuation process of people when fire occurs in a high-rise building, the evacuation process in a ten-storey telecom office building is simulated under different opening conditions by using FDS+Evac software. The temperature field, smoke layer height and toxic gas index are analysed quantificationally. The results prove that about 70% of time is wasted in the stairs because of the stoppage during people evacuation. The exit numbers have little effect on the evacuation time if the number of people is small and they are familiar with the exits. However, adding another stair case in the building is able to reduce 1/3 time of evacuation.

Development of Firing on Board System of an Armored Vehicle Using Active Front Wheel Steering System

Vimal Rau Aparow, Khisbullah Hudha, Megat Mohamad Hamdan Megat Ahmad, Shohaimi Abdullah
National Defense University of Malaysia, Malaysia

The aim of this paper is to minimize the unwanted disturbance occurred in a wheeled armored vehicle during firing. An unwanted yaw moment occurred at the Center of Gravity (CG) of the armored vehicle caused by the impulse force generated during firing. This firing force tends to create instability conditions for the armored vehicle during firing. Therefore, an active safety system known as Active Front Wheel Steering (AFWS) is implemented to provide steering correction as a counter action of the firing disturbance and return the armored vehicle back to its initial travelling direction after firing moment. The AFWS is developed based on various control strategy known as yaw rate feedback, side slip feedback and firing moment estimator feedback with summation moment reference (SuM-FME) controls. Each control strategies are evaluated using two types of vehicle speed, 40 and 60 km/h in order to study the performance of AFWS while in dynamic condition. A suitable control strategy is selected as the firing on board system (FoBS) to enhance the dynamic performance of the armored vehicle during firing.

Credit Risk Assessment Model of Small and Medium-Sized Enterprise Based on Logistic Regression

Hui Sun, Mingyuan Guo
Tianjin University, China

Small and medium-sized enterprises play a very important role in China's economic and social development. Their development is inseparable from the financial support, and the development of credit business is also an important aspect of bank's operation. At the time of solving the problem of financing difficulties of small and medium-sized enterprises, how to manage credit risk will become an important subject to study. In this paper, we choose 50 money-borrowing enterprises' financial data in a commercial bank as samples to construct logistic risk assessment model. We make regression analysis, Hosmer-Lemeshow test and Hosmer-Lemeshow randomness test. The empirical results show that the logistic risk assessment model has good fitness of the data.

A Time-Variant Reliability Modeling and Analysis Method of Multi-State Complex Electromechanical System

Qian Wang, Jianguo Zhang, Linjie Kan, Pidong Wang
Beihang University, China

Complex electromechanical systems considering performance degradation are multi-state systems which cannot be described by traditional reliability theories based on the binary states assumption. Generally, such systems contain both electronic and mechanical components that have different failure mechanism and characteristics. In addition, states of the system and its components are time-variant, which makes reliability modeling and analysis challenging. To overcome these difficulties, a hierarchical modeling approach is proposed in this paper. At the component level, we adopt a homogeneous Markov chain model for electronic components and a multi-state physical model based on Monte Carlo simulation for mechanical components respectively. After that, we extend an original multi-state multi-valued decision diagram (MMDD) method to a time-variant MMDD method for representing the system structure function at the system level. A practical engineering example of a space drive system is provided to illustrate the proposed method.

Design and Development of GUI Based Model for Fault Diagnosis of Induction Motor

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Modeling and fault diagnosis of induction motor are main objective of this paper. This paper focused on the motor current signature analysis (MCSA) which utilizes the results of spectral analysis of the stator current. FFT is used for spectrum analysis and frequency of stator current observed for healthy and faulty induction motor. With the help of Matlab Simulink, KQJJ –IMFD model is developed for fault diagnosis of induction motor using FFT. KQJJ-IMFD model is new, simple, and understandable and detects various faults. In this paper various induction motor faults like voltage unbalance, rotor fault, and stator fault are simulated and detected with the help of current spectrum through FFT analysis on the stator current.

The Influence Factors on Channel Selection: A Study on Online Shopping for Infant Milk Powders

Xuejing Yang[1], Wei Guo[1], Xin Li[2], Yiwen Chen[2]
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[2]Chinese Academy of Sciences, China

This paper studied the key factors influencing consumer purchase decision on infant milk powders under the context of e-commerce. In recent years there have been several scandals exposed about Chinese milk powders, causing major concerns among consumers and scholars. Meanwhile, e-commerce is fast developing in China, this study is aimed to understand what are the key factors influencing the consumer purchase intention in e-commerce and the correlations between the key variables. We first interviewed 30 parents (having kids 0-3 years old) and found that the following factors influence consumer purchase decisions: familiarity, trust and satisfaction. We then tested the relations among these factors with purchase intention with questionnaires.   The study extended the theoretical framework on Trust, trust tendency, satisfaction, familiarity and their effects on Purchase intention, and also provided some guidance to the business managers on effectively communication in e-commerce to promote business.

Reviews on Third-Party Website and E-Commerce Overseas Expansion Strategy

Lei Chen, Bin Shen, Qingying Li
Donghua University, China

E-Commerce is nothing new to our world. The recent growing trend shows that firms employ e- commerce not only as marketing and vending tools but also as a main international expansion instrument. Today, progressively more consumers purchase foreign goods though online B2C website. Despite the sharp growth of oversea online shopping, there appears to be a lack of comprehensive research for its mechanism. We conducted a survey of 292 consumers in China who had at least once overseas online shopping experience. We found that in-depth user generated reviews (UGR) in the third-party website significant influence consumersâ€™ intention on participating oversea online shopping. This research proposed a theoretical model to explain the behavior of oversea online shopping. We then discussed international develop strategy by utilizing e-commerce.

The Impact of Channel Integration on Channel Reciprocity in the Multi-Channel Retailing Context

Kan Jiang, Liuyan Xu, Xiaoning Bao
Guangxi University, China

This study explores how to create a reciprocal relationship between online and offline channel by improving channel integration. Data for this study were collected from 552 Chinese customers who completed a questionnaire. Participants were asked to have purchased products or services with the use of at least two channels operated by a same retailer. The partial least square (PLS) structural equation modeling was conducted to test hypotheses. The results illustrate that channel integration has a direct influence on channel reciprocity and it also influences channel reciprocity indirectly through online or offline trust. Three constructs of channel integration are identified: integrated information, integrated channel access and integrated customer service. Trust transference, bidirectional channel referrals and image transference are found to construct channel reciprocity. Implications for multi-channel retailers are discussed based on these findings.

Applying Social Marketing Theory to Develop Retargeting and Social Networking Advertising Website

Keng-Chieh Yang[1], Chia-Hui Huang[2], Conna Yang[3], Chen-Wei Tsai[4]
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Retargeting advertising is a new technique applied for online marketing. In the past few years, retargeting advertising had been used in online advertisement. It explored the product information for visitors and focused advertising spending on people who are already familiar with your brand and have recently demonstrated interest. This study applies Social Marketing Theory to develop retargeting advertising system and combines it with social networking advertising. We also develop an E-commerce website to include these two kinds of advertising. Our experimental website was developed by Microsoft ASP.Net 4.0 in C# and JavaScript program. We also use focus group analysis to analyze the conceptual model of our study. Our findings can provide references for practitioners and researchers.

AHP Based Weighting System for BIM Implementation & Assessment Framework

Keyu Chen, Haijiang Li
Cardiff University, United Kingdom

BIM is a newly emerged concept improves the productivity and sustainability of Architecture Engineering and Construction (AEC) projects. The recent evolution of Building Information Modelling (BIM) reached a bottleneck, where BIM's effectiveness need to be identified for further improvement. It also provides users with a guidance and assistance, with priorities of implementation, is urgently needed. In previous research, a BIM implementation model has been proposed based on existing documentations and verified by Delphi methods for deep exploration in a particular context. As part of this continuous research, the AHP method has been adopted as a follow-up research method which will be presented in this paper. An analytical hierarchy model was concluded for a leading design organisation, including project management, organisational management, BIM application and stakeholder involvement. Ten experienced senior engineers from the management team have participated in the AHP questionnaire. Sensitivity analysis has also been adopted to balance resource input in order to meet specific corporate strategies.

A New Approach in Considering Vagueness and Lack of Knowledge for Selecting Sustainable Portfolio of Production Projects

V. Mohagheghi[1], S. M. Mousavi[1], Ali Siadat[2]
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Today's changing and competitive market forces the organizations to consider uncertain factors in any production related decision making efforts. On the other hand, considering sustainability in choosing a portfolio of production projects to make justice between generations is essential. Achieving satisfactory results in sustainable goals without considering uncertainty is almost out of the question. Therefore, in this paper a new approach in considering uncertainty in sustainable decision making is introduced that is based on Atanassov fuzzy sets. This new model of sustainable project portfolio selection with application in production projects has two main phases: first, a new decision index is extended to evaluate the proposed projects. Second, a mathematical model is proposed to consider sustainability and risk. Moreover, a highly flexible method of ranking is introduced. Eventually, to depict the effectiveness and efficiency of the approach, it is used to solve a practical example and the results are presented.

Project Management Approach for Turbine Maintenance in Power Utility Plants: The Case of a South African Maintenance Company

Teddy Mtembi, Grace Kanakana
Tshwane University of Technology, South Africa

The current challenging environment in the power generation sector in South Africa is not unique to the country. Many other countries face similar challenges characterized by unreliability of power supply, low capacity utilization and availability factor, deficient maintenance, poor procurement of spare parts, and high transmission and distribution losses among other problems. The need for a disciplined and tailor-made project management approach to ensure maintenance projects are effective and efficient has never been more apparent. In this study the case of a Turbine and Generator Maintenance Company was evaluated to assess the state of project management within this sector, and to determine some of the barriers to project implementation. A project management approach for efficient implementation was developed and delays in the procurement process are found to be the main barrier for project implementation success.

Triggering an Internal Service Innovation in Manufacturing Firms

Yang Yang Zhao, John Kafka
Buskerud and Vestfold University College, Norway

The importance of a service innovation as a result of increasing competition and customer demands in manufacturing firms has been widely recognized. Especially, a service innovation can be incorporated internally to sustain a firm' competitive advantage. In the context of manufacturing firms, this study investigates the triggering factors of an internal service innovation and its corresponding implementation strategy. This study adopts a multiple case studies method and examines the critical factors: internal user involvement and top management support. It is found the internal user involvement is neither the trigger nor significantly contributing to an internal service innovation's success. On the other hand, the top-management support is ascertained to be crucial for such a success; top-down approach is more likely to happen to implement the new internal service. Additionally, a new factor, economic freedom, is found to have a significant impact (positive) on an internal service innovation's success.

Enterprise's WeChat Use and its Impact on Firm Performance – From the Perspective of Value Co-Creation

Jifan Ren, Ruo Nan Li
Harbin Institute of Technology Shenzhen Graduate School, China

As an emerging social media, WeChat has brought a shock both theoretically and practically, which caused the shift of service mode and content. However, research on WeChat application and its impacts on performance at firm level are rare. This study examines how WeChat use influence firm performance through customer relationship management (CRM) capability, and value co-creation. Partial least squares (PLS) were used to analyze the 240 data collected. Results indicate that Wechat use has a significant impact on value co-creation, and both value co-creation and CRM capability are significantly related to firm performance. Implications and conclusions and discussed.

Impact of Risk-Taking Leadership on Organisational Performance and Sustainability in SMEs

Wilson Maladzhi
University of South Africa, South Africa

In South Africa, innovation culture is relatively at a slow pace compared to other countries of the world. Studies showed competent leadership should be able to achieve higher innovativeness through risk-taking. Thus, this study aims to analyse the impact of risk-taking leadership on the innovativeness within Small and Medium-sized Enterprises (SMEs) in the Western Cape, South Africa. A risk-taking leadership model was proposed to demonstrate the relationship between leadership and innovativeness. A quantitative approach was employed and a self-administered questionnaire for data collection. The sample included 366 employees and 57 leaders from 50 SMEs in the Western Cape. The findings depicted that the leaders did not strongly possess risk-taking qualities. The proposed model proved that leaders who possess risk-taking characteristics are capable to create an innovative environment.

TRIZ-PUGH Model, New Approach for Creative Problem Solving and Decision Making

Jakrapong Karnjanasomwong, Natcha Thawesaengskulthai
Chulalongkorn University, Thailand

The challenge of manufacturing firm today is to maintain competitive advantage in rapid market and customer requirements change environment. Respond to the problems quickly, accurately with breakthrough ideas and make decision from available various alternatives will be crucial. TRIZ-PUGH model which incorporate between TRIZ methodology and Pugh's matrix is created. TRIZ is the systematic methodology for creating unusual alternative solutions to resolve technical contradiction in engineering area and Pugh's matrix aim to logically establish meaningful criteria then deliberately select the best known ideas for efficiently support manufacturing strategies. The application of TRIZ-PUGH model is shared in the case study of solving the problem at selected process in magnetic recording head manufacturing factory.

Evaluation of the Reliability Performance of an Inter-Campus Bus System

Michael Sizwe Mkwanazi, Charles Mbohwa, Takalani Nemarumane
University of Johannesburg, South Africa

Performance evaluation is important especially in the field of operations management in order to suggest or to find ways to improve existing systems. This research study is part of a large qualitative and quantitive mini-dissertation study and seeks to unpack the reliability performance indicators for an intercampus bus system. Travel time and service reliability measure the performance of any passenger transport system. These look at the time spent on waiting, time spent in transit, panctuality and adherence to the time schedule. This study results are drawn from 121 questionnaires which were successfully completed. Recommendations on the use of Six Sigma and involving other divisions in the operation of the University of Johannesburg Intercampus bus shuttle service in order to improve performance are presented in this study

The Information Security in Semiconductor Industry

Shirley Zhao, Sherry Zhu, Sherry Guo
Semiconductor Manufacturing International Corporation, China

With the further development of computer and network technologies, information security requirements in semiconductor field has been elevated to a new stage. Owing to the developments of advanced (e.g., 28nm and 14nm) technologies and the applications in high confidentiality arenas, more and more semiconductor design and manufacture companies realize the needs of tighter and more systematic controls on company information. The question is what are the effective controls? It has become a hot topic in recent years. To better control information security, the companies should not only use technologies but also apply effective management regulations to systematically ensure information security. This paper gives a brief introduction of technology protection and physical management method to protect IC field information assets safety.

Applying Large-Scale Linear Programming in Business Analytics

William Chung
City University of Hong Kong, Hong Kong SAR

This paper is to discuss how to apply large-scale linear programming (LP) in business analytics. Two types of scenario-based LP problems are described, which would become very large-scale LP problems due to the availability of big data. Possible solution approaches are discussed according to the special structure of the problems. Further development of the solution methods is also included.

Latent Customer Needs Elicitation for Big-Data Analysis of Online Product Reviews

Feng Zhou, Roger Jiao
Georgia Institute of Technology, United States

Traditional customer needs elicitation methods are often time and cost consuming due to the linguistic analysis of customer needs. Furthermore, many of them are unable to identify latent customer needs, such as interviews and focus groups. This paper proposes a new paradigm of customer needs elicitation based on sentiment analysis of individual product attributes of online product reviews. Support vector machines are used to build prediction models built on the features extracted from a list of affective lexicons based on affective norms for English words and WordNet. The proposed method is able to compile sentiment information on individual product attributes, attribute levels, and/or sub-attributes. Such information greatly facilitates the process to elicit customer needs, especially latent ones. A case study of Kindle Fire HD 7 inch tablet is used to illustrate the potential and feasibility of the proposed method.

The Impact of Plan Form of Circulation Systems in Large-Scale Environments on Space Cognition: Case Study in Two Shopping Malls in China

Rui Zhao, Xin Li, Yiwen Chen
Institute of Psychology, Chinese Academy of Science, Beijing University of Technology, China

The purpose of this article is to explore the impact of different plan form of circulation systems on spatial information processing and orientation abilities of newcomers in unfamiliar large-scale commercial environments. Two shopping malls in Beijing were chosen to apply the same field experiments, which were in the same conditions except different types of circulation systems---- one with multi-atriums and linear serial type of circulation system and the other with single-atrium centric radiation type of circulation system. Space transition nodes from horizontal route to vertical route in each circulation system were various as well. A total of 69 participants were divided randomly into two groups and complete 4 separate tasks to explore the correlation between different types of circulation systems and space orientation performance. Personal difference in cognitive styles and spatial abilities were examined as well to explore the correlation with space orientation behavior. The main conclusion was that performance of space cognition tasks of space users in multiatriums and linear serial type of circulation system is superior to single-atrium centric radiation type of circulation system. Cognitive style of space users was correlated with performance in space cognitive sketch-map tasks and the answers to a questionnaire.

The Processing Method of Temperature Drift Data for Prediction Based on Wavelet Theory

Lizhi Wang, Xinlei Zhao, Xiaohong Wang, Xinlan Li, Yuxiang Li
Beihang University, China

To solve the problem in the temperature drift data processing of photoelectric products based on temperature modeling compensation method, a new temperature drift data processing method is proposed. This method can analyze the data in different frequency with the wavelet theory, and then process the data and reject the temperature influence. The degradation data is taken as a research example, then the method is described minutely and the simulation method is used to verify its effectiveness. The research indicates the proposed method in this paper is useful to the photoelectric products' temperature drift data process, and is helpful to improve its reliability evaluation accuracy.

Utilizing Product Configuration Systems for Supporting the Critical Parts of the Engineering Processes

Katrin Kristjansdottir, Sara Shafiee, Lars Hvam
Technical University of Denmark, Denmark

Engineering-To-Oder (ETO) companies have to respond to increasing demands to provide highly customized and complex products with high quality at competitive prices. In order to respond to those challenges ETO companies have started to implement product configuration systems (PCS) to increase efficiency of the specification processes. Due to complex products and processes in ETO companies PCS are usually gradually implemented where only subset of the products are included to support specific processes. However, a systematic way to identify and evaluate the products and the processes to be supported with the PCS is not described in the current literature. This paper aims to pursue that research opportunity by presenting a framework to identify the critical parts of the engineering processes so the most promising business cases for the implementation of PCS can be found and used to prioritize the future projects.

Real-Time Scheduling Home Caregivers Based on Disruption Management

Biao Yuan, Ran Liu, Zhibin Jiang
Shanghai Jiao Tong University, China

Unexpected disruptions often occur when home caregivers provide service for customers, such as new requests of customers, cancellations of customers' services, and changes of customers' time windows. These disruptions sometimes may make the original plan non optimal or even infeasible. In practice the strategy of rescheduling is usually utilized to obtain a new plan with minimal operational cost, but largely deviates from the original one. To address this kind of situation, we introduce the principle of disruption management into the real-time or disrupted home caregiver scheduling problem. We first define the disruption measurements on customers, caregivers and companies, then take them as the minimization objective, and finally employ a tabu search algorithm with a cost record mechanism to solve the proposed problem. The performance of the strategies of rescheduling and disruption management is compared and discussed in the case study.

Efficiency of Publicly-Traded Medical Device Companies in Taiwan – An Analysis Using Window-DEA

Chun-Fu Hong, Yi-Hsing Lin
National Quemoy University, Taiwan

Owing to the limitations of the data collected, this study has applied window-DEA to estimate the managerial efficiency of medical device companies in Taiwan. Six publicly-traded medical device companies were recruited for this study over the 2005-2014 period. The results show that Excelsior, the most efficient company, has the potential to further improve its average efficiency by 14.5%, and SVBI, the worst company, has the potential to further improve its average efficiency by 92.6%. The average efficiency improvement potential of these companies ranged from 51.5% (2011) to 68.4% (2008) during the 2005-2014 period. In addition, we found that the exchange rate for the U.S. and Germany exerted significant impacts on the efficiency of these medical device companies in Taiwan. The managerial efficiency increased by 1.727% when the U.S. dollar exchange rate increased by 1% and the efficiency increased 1.697% when the Deutsche mark exchange rate decreased by 1%.

Constructing a Framework to Manage High Utilizers In Health and Social Care

Tomi Malmstrom, Antti Peltokorpi, Markus Lappalainen
Aalto University, Finland

In health and social care highly skewed consumption of expenditures are reported, where 10% of the population consume over 80% of the total care costs. This research aims to understand the high utilization of combined social and health services more profoundly and identify what should be taken into account when planning services for high utilizers. Varied demographic details and variations in the persistence suggest that efforts to curb high utilization should be diverse and specific towards thing they want to prevent. Finding feasible solutions for high use is a multidisciplinary task that requires timely use of information in a service delivery system that promotes proactivity.

A Game Theory Based Resource Scheduling Model for Cost Reduction in Home Health Care

Zhijie Xie[1], Nimisha Sharath[2], Chun Wang[1]
[1]*Concordia University, Canada*
[2]*National Institute of Technology, India*

This paper proposes a game theoretic scheduling model for reducing service cost in home health care. We focus on a setting where a group of independent health care practitioners need to be assigned to home visits within a time window. The practitioners have different skill sets, time constraints and client preferences. They also expect reasonable payments given their skill levels and cost incurred in order to provide the services. On the other hand, the home health agency wants to schedule practitioners to the visits such that all planned visits are covered with qualified practitioners and, at the same time, the overall service cost are minimized. We study the home health care resource scheduling problem in an economic setting where practitioners are modeled as self-interested agents. We present an iterative bidding framework as a decentralized decision support tool which enables automated negotiation between the home health agency and the practitioners. The effectiveness of the framework is evaluated through a computational study. The results show that the proposed framework computes high quality schedules in the decentralized home health care environment.

Author Index

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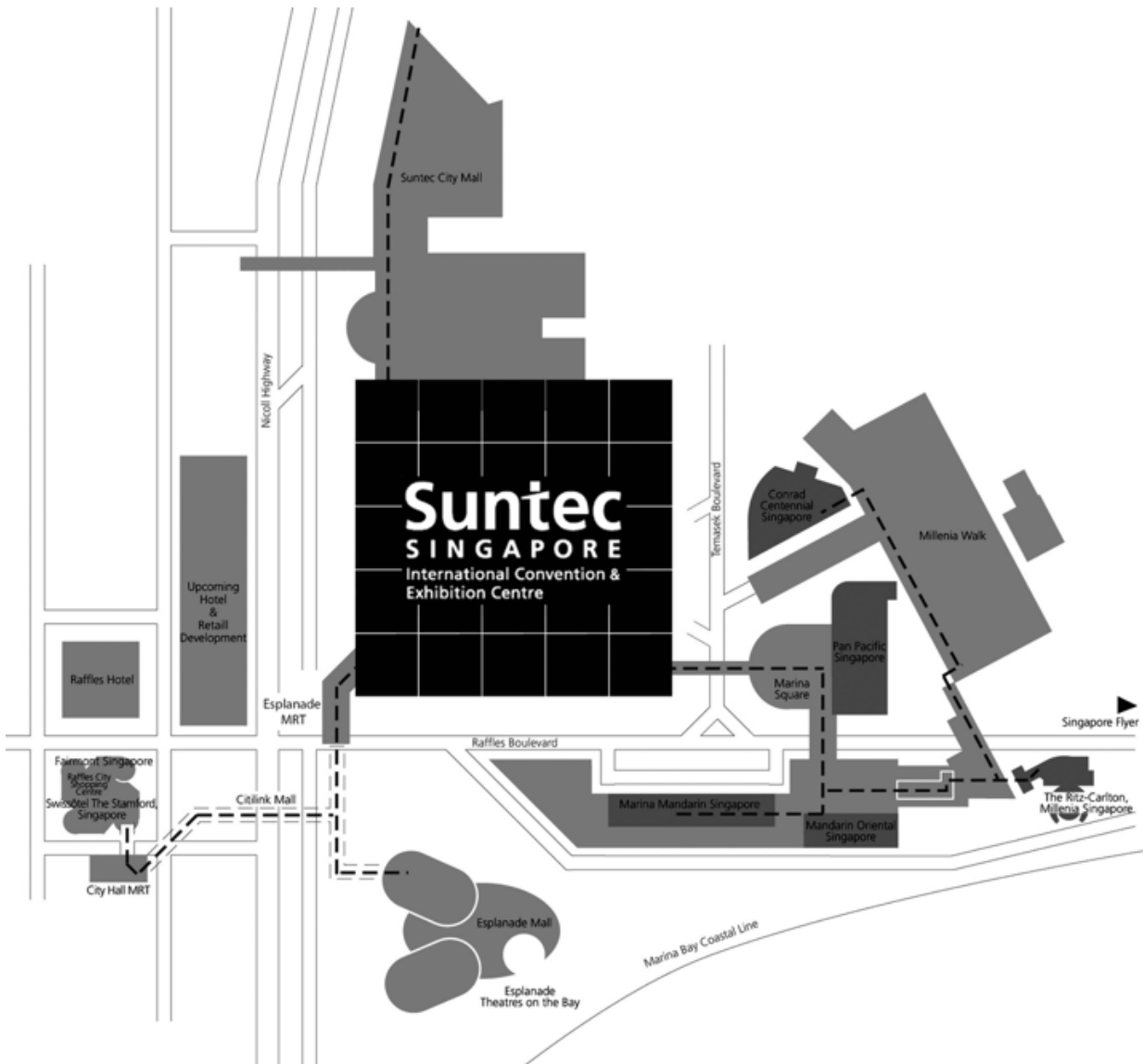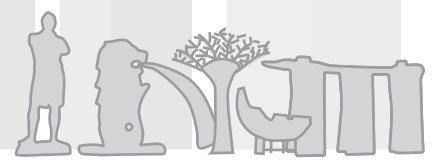
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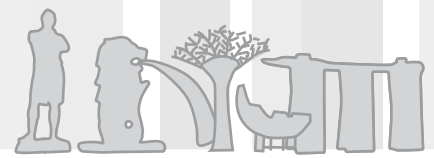
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The nearest MRT Stations are Esplanade Station (CC3) and Promenade Station (CC4/DT15) via the Circle Line which will bring you directly to Suntec Singapore.
Alternatively, take the MRT to City Hall Station (NS25/EW13), followed by a five to ten minutes walk via an underpass to Suntec Singapore.

Walking from MRT station
- 1 min from Promenade and Esplanade MRT
- 5 - 10 mins from City Hall MRT

Singapore has one of the most extensive and efficient public transportation systems in the world. Travelling in the city and suburbs is typically a quick and affordable affair.

Singapore Train Services

The Mass Rapid Transit (MRT) operates an extensive network of trains serving stations all across the island. It is a fast and cost-effective way of getting around Singapore. There are currently four main lines, the North-South Line (Red), East-West Line (Green), North-East Line (Purple), and Circle Line (Orange), with plans for future expansion on the existing MRT system. Some MRT Stations are linked to several bus interchange stations, making it even more convenient to continue your journey to areas in Singapore not covered but the MRT.

Bus

Also conveniently available are Singapore's public bus services. There are currently more than 300 bus services which run daily from 5.30 to midnight, even covering destinations that are less available. The two main bus service providers in Singapore are SBS Transit and SMRT Buses.

Taxi

Taxis ply the island round the clock, bringing you wherever you want, anytime you want. However, do note that peak-hour, city area and ERP gantry surcharges apply. There are numerous taxi stands available island-wide, as well as in hotels and shopping centres.
Here are the hotlines for various taxi services in Singapore, which will come in handy if you end up in a more obscure part of the island where the traffic is sparse, or if you are unable to find a taxi during peak hours or any other reason. If you're coming from an entertainment or dining venue, most concierge services will also be happy to call a taxi for you.

The city's major cab companies are:

Comfort Transportation Pte Ltd / CityCab Pte Ltd: (65) 6552 1111
Premier Taxis Pte Ltd: (65) 6476 8880
Maxi Cab: (65) 6535 3534
SMRT Taxis: (65) 6555 8888

Sentosa

Sentosa Island is home to the Resorts World Integrated Resort, as well as a theme park, wildlife reserves, gardens, animal parks, adventure rides, restaurants and spas, enursing non-stop fun around the clock.

Getting There: Take the Sentosa Express from Sentosa Station located on the 3rd level of Vivocity (next to Harbourfront MRT Station).

Operating Hours: Whole Day
Website: http://www.sentosa.com.sg

Universal Studios Singapore @ Resorts World Sentosa (Within Sentosa)

Sentosa Island is home to the Resorts World Integrated Resort, as well as a theme park, wildlife reserves, gardens, animal parks, adventure rides, restaurants and spas, enursing non-stop fun around the clock.

Getting There: Alight at Harbourfront MRT station and transfer to RWS 8 or take the Sentosa Express then alight at Waterfront Station.

Operating Hours: 10am to 7pm
Website: http://www.rwsentosa.com/Attractions/UniversalStudiosSingapore

Gardens by the Bay

Take a walk in Singapore's new award-winning horticultural attraction – Gardens by the Bay. It houses over 380 thousand plants in Singapore's new downtown – Marina Bay. Hungry after a long stroll? End the night for with a sumptuous feast of freshly grilled meat on sticks or satay, together with other local delights such as chicken r ice & rojak at the food court - Satay by the Bay.

Getting There: Alight at Bayfront MRT Station and take a 5-minute walk.

Operating Hours: Ticketing Hub (9am to 8pm daily)
Website: http://www.gardensbythebay.com.sg/en/home.html

National Museum of Singapore

With a rich history dating back to its inception in 1887, the National Museum of Singapore is Singapore's oldest museum with the youngest and most innovative soul. The galleries adopt cutting-edge and varied ways of presenting history and culture to redefine conventional museum experience.

Getting There: Alight at Dhoby Ghaut MRT Station and take a 5-minute walk.

Operating Hours: 10am – 6pm Daily
Website: http://www.nationalmuseum.sg

Singapore Flyer

Officially launched in 2008, Singapore Flyer stands at 165 metres, with a diameter of 150 meteres, making it the tallest Giant Observation Wheel in the world. Singapore Flyer offers a breathtaking panorama of the shimmering Marina Bay waterfront and historical landmarks dotting the city skyline.

Getting There: Alight at Promenade Station (Circle Line, CC4) and take a 5-minute walk. Take Exit A and look out for the blue pedestrian signs to Singapore Flyer.

Operating Hours: 8.30am – 10pm Daily
Website: http://www.singaporeflyer.com

Marina Bay Sands

Marina Bay Sands features three cascading hotel towers topped by an extraordinary sky park, 'floating' crystal pavilions, a lotus-inspired Museum, retail stores featuring cutting-edge labels and international luxury brands, trendy Celebrity Chef restaurants, endless entertainment at the theaters, the hottest night clubs and a Las Vegas-style casino

Getting There: Alight at Bayfront MRT Station (CE1, Exit B, C, D, E) and take a 5-minute walk.

Operating Hours: Whole day
Website: http://www.marinabaysands.com

Photo Sources:
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