ICSI 2019

The 10th International Conference on Systematic Innovation

Program Brochure

July 8 - 11, 2019, Liverpool, UK
The University of Liverpool Management School

Co-Organizers :
International Society of Innovation Methods (I-SIM)
The Society of Systematic Innovation (SSI)
The University of Liverpool Management School (Local Host)
Nottingham University Business School

Web: http://www.i-sim.org/icsi2019
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Conference Grand Schedule

Conference Schedule

Venue: South Campus Teaching Hub (SCTH) Building, University of Liverpool
Location: 140 Chatham St, Liverpool L7 7BA

Date	Time	Program	Location
08/07/2019 (Monday)	9:00-17:00	Pre-conference Tour	Pick up @Vine Court
09/07/2019 (Tuesday)	08:30-17:00	Registration	Entrance Lobby
	09:00-12:00	**Tutorial A**: High Impact TRIZ & Systematic Innovation for Beginners (by Prof Darrell Mann) Coffee break will be provided from 10:20-10:40	Moot Room
	12:00-13:00	Lunch Break	First Floor Open Area
	13:00-13:30	**Opening Ceremony**	Moot Room
	13:30-14:30	**Keynote A**: TRIZ and AntiFragile Systems (by Prof Darrell Mann)	Moot Room
	14:30-15:00	Group Photo & Coffee Break	First Floor Open Area
	15:00-17:15	ICSI Parallel Sessions	Seminar Room 3, 4
		GCSI Presentations	Seminar Room 1
	17:20-18:00	I-SIM Annual Meeting / Dinner Boxes	Seminar 1
10/07/2019 (Wednesday)	08:30-17:00	Registration	Entrance Lobby
	09:00-10:00	**Keynote B**: Emerging Issues in Technological Innovation, Entrepreneurship and Management – Positioning leading research to be seminal works (by Prof Jonathan Linton)	Moot Room
	10:00-10:20	Coffee Break	First Floor Open Area
	10:20-11:00	**Special Speech A**: The Digital and Social Foundations of Collaborative Innovation in SMEs (by Prof Andrew Lyons)	Moot Room
	11:00-12:00	**Editor's Panel Session** (with Prof Jonathan Linton, Prof Andrew Lyons, Prof Darrell Mann, Prof D. Daniel Sheu, Dr. Yichuan Wang)	Moot Room
	12:00-13:00	Lunch Break	First Floor Open Area
	13:00-14:00	**Keynote C**: Integrating SI and AI for New Research and Applications (by Prof D. Daniel Sheu)	Moot Room
	14:10-15:40	ICSI Parallel Sessions	Seminar Room 3, 4
		GCSI Presentations	Seminar Room 1
	15:40-16:00	Coffee Break	First Floor Open Area

	16:00-17:15	ICSI Parallel Sessions	Seminar Room 3, 4
		GCSI Presentations	Seminar Room 1
	18:30-20:30	**Conference Banquet**	City Centre
11/07/2019 (Thursday)	08:30-12:00	Registration	Entrance Lobby
	09:00-10:45	ICSI Parallel Sessions	Seminar Room 3, 4
	10:45-11:00	Coffee Break	First Floor Open Area
	11:00-11:30	**Special Speech B**: Disruptive Innovation: New Processes and Methods (by Prof. R.H. Tan)	Moot Room
	11:30-12:00	**Closing Announcements & Awards**	Moot Room
	12:00-13:00	Lunch Break	First Floor Open Area
	13:00-16:00	**Tutorial B**: Problem Reframing for Innovative Problem-solving: System transfer and causal analysis (by Prof D. Daniel Sheu) Coffee break will be provided from 14:20-14:40	Moot Room
	16:30-17:30	Optional Campus Tour	@ULMS Reception

Forward

The organizers of the International Conference on Systematic Innovation (ICSI) and Global Competition on Systematic Innovation (GCSI) are pleased to present the proceedings of the conference and the Program of Innovative Project Competition which includes 77 papers and 14 finalist innovation projects.

This conference is co-organized by International Society of Innovation Methods (I-SIM), Society of Systematic Innovation (SSI), University of Liverpool, and the Journal of Systematic Innovation (IJoSI). Whether the papers included in the proceedings are work-in-progress or finished products, the conference and proceedings offer the authors opportunities to disseminate the results of their research and receive early feedback from colleagues, without the long waiting associated with publication in peer-reviewed journals. On the other hand, the presentations and the proceedings do not preclude the option of submitting the work in an extended and finished form for publication in any peer-reviewed journal. Best papers and projects from the conference will be invited to submit full papers to the supporting journals such as *Technovation* (SCI & SSCI, IF:5.25), *IJoSI* (SCOPUS), *Computers and Industrial Engineering* (SCI, IF:3.518), *International Journal of Logistics: Research & Applications* (SSCI, IF: 1.820) and *the TRIZ Journal* for review toward publication. This is a great opportunity that so many high quality journals are considering papers from this conference.

The organizers are greatly indebted to a number of people who gave their time to make the conference a reality. The list of organizations and working team who have contributed tremendously to create this conference are acknowledged at the end of this program brochure. There are more contributors who are beyond the list.

The conference is a leading international conferences in the world in the field of innovation methods/SI/TRIZ and typically has one of the best quality programs. The next ICSI conference will be in HEBEI University of Technology in Tianjin, a culture and tourism rich city near Beijing. There will also be the tradition of free one day scenic tours immediate before the conference for international participants. You are invited to continue joining the 2019 ICSI/GCSI events in 2020.

We are confident that you will find this conference very rewarding. If there is anything needing assistance, please feel free to let the attendant(s) at the service desk know. We are here to serve you.

With best regards,

D. Daniel Sheu, General Chair, the 2019 ICSI/GCSI
President, International Society of Innovation Methods
Honorary President, Society of Systematic Innovation
Editor-in-Chief, the International Journal of Systematic Innovation (IJoSI)
Area Editor, Engineering Design and Innovation Methods, Computers and Industrial Engineering
Professor Emeritus, National Tsing Hua University, Taiwan, R.O.C.
2019.07.09

Tutorial A

High Impact TRIZ & Systematic Innovation For Beginners

Speaker Name: Darrell Mann
Professor, University of Buckingham
CEO, Systematic Innovation Ltd
Editor-in-Chief, *The TRIZ Journal*

Speaker Biography:
Darrell is an engineer by background, having spent 15 years working at Rolls-Royce in various R&D related positions, including a leading role in the Company's transition from selling jet-engines, to selling 'power-by-the-hour', and ultimately becoming Chief Engineer responsible for the company's long term future military engine strategy. He left the company in 1996 to first help set up a high technology company spin-out from Imperial College, London, before entering a programme of systematic innovation research at the University of Bath. He first started using Systematic Innovation in 1992, and by the time he left Rolls-Royce had generated over a dozen patents and patent applications. In 1998 he started teaching Systematic Innovation methods to both technical and business audiences, and to date has given workshops to over 12,000 delegates across a broad spectrum of industries and disciplines. He continues actively use and develop the Systematic Innovation methodology. With over 800 systematic innovation-related papers and articles to his name, plus the best-selling 'Hands-On Systematic Innovation' books, Darrell is now one of the most widely published authors on the innovation subject in the world. He is CEO of Systematic Innovation Ltd, a UK based innovation company with offices and affiliates in India, Malaysia, China, Denmark, Turkey, Australia, US and Austria. Featured in Who's Who in the World, Darrell is now recognised as one of the world's most prolific inventors. He is a Professor at the University of Buckingham in the UK, and Taylor's University in Malaysia.

Abstract/Outline:
The prevailing view in the traditional Soviet TRIZ world is that learning the tools, methods and philosophy of TRIZ is the work of a lifetime. 'TRIZ Experts' have typically been viewed as people who had accumulated over 25 years of experience. It is important that the world possesses such experts, but it is also true that it is highly possible to be using TRIZ to good effect in much shorter periods of time, in some cases – if things are done well – in a matter of hours. This tutorial is targeted specifically at people with relatively little prior knowledge of TRIZ that have a desire to define and solve problems more effectively. The hands-on session will take an outside-in look at TRIZ and its 21st Century successor, Systematic Innovation, with a view to teaching people the core elements that will allow them to be productively using some of the key thinking processes contained within the overall method. What we know now that the original TRIZ researchers could not have known is what makes up the 'DNA' of successful innovation attempts. 98% of all attempts will end in failure. 'High Impact TRIZ' is all about what the 2% of successful innovation teams did and did not do. We will start with the DNA 'Pillars' of TRIZ/SI and cascade down from these pillars into a number of core thinking protocols and tools that will enable beginners to gain the earliest possible feel for how TRIZ is different from other problem solving tools and techniques, and to gain one or two new insights into real problem situations that delegates may wish to bring to the tutorial. It will also provide delegates with the best ways to go back to their workplaces and communicate the benefits of TRIZ to others.

Tutorial B

Problem reframing for innovative problem-solving: system transfer and causal analysis

Speaker Name: D. Daniel Sheu
Professor Emeritus, National Tsing Hua University
President, International Society of Innovation Methods
Editor-in-chief, International Journal of Systematic Innovation (SCOPUS indexed)
Area Editor, Computers & Industrial Engineering (SCI indexed, top 4% impact factor)

Speaker Biography:

Daniel has 9 years of industrial experience primarily in the electronic industries with Hewlett-Packard, Motorola, and Matsushita prior to joining National Tsing Hua University as a professor where he served for 23 years. He is a Visiting Professor at Shanghai Jiao Tong University. Daniel has expert knowledge in systematic Innovation including TRIZ. He has developed more than 20 new TRIZ^{++} tools. Daniel has taught/facilitated more than 100 sessions of industry training/consulting courses in more than 70 companies. He is a certified TRIZ Expert in Training and problem-solving consultation. Daniel Conducted 24 national/cross-strait conferences and 9 international conferences in the areas related to systematic innovation/Manufacturing Engineering. He has been invited to deliver keynote/plenary speeches 12 times in international conferences and 15 times in national conferences. Daniel published 44 peer reviewed journal papers, 174 conference papers, authored 11 books, and translated 4 books. Daniel holds 10 patents from Taiwan, China, and USA.

Abstract:
Many people solve a problem from where the symptom is or the problem occurred. Well trained problem solver would find out the cause effect chain of the problem and solve the problem from the root causes of the problem. A third and much more innovative problem solving approach is not to deal with where the problem is or is caused but to deal with a location which is seeming unrelated to the problem and solve the problem more elegantly at that seemingly unrelated location. We call it **system transfer**: transferring the issue of a problem to a seemingly unrelated place and resolve the transformed issue at that place.

This tutorial presents a systematic method for problem reframing in order to identify a variety of different issues to solve the existing problem. This process can expand the original problem into different hierarchies, and integrates the concept of system transfer and causal analysis in the problem hierarchy. The process helps problem solvers break psychological inertia to reframe and refocus the problem to identify different problems to solve and the original problem may be solved more effectively. It can also be used in identifying innovative products for development. Besides multiple illustrations of the problem reframing techniques, hands-on exercises will also be given to help the participant appreciate the thinking methods which will be very useful in seeing the whole scope of related problems and select best place to solve the problem.

Keynote A

TRIZ And AntiFragile Systems

Speaker Name: Darrell Mann
Professor, University of Buckingham
CEO, Systematic Innovation Ltd
Editor-in-Chief, *The TRIZ Journal*

Speaker Biography:

Darrell is an engineer by background, having spent 15 years working at Rolls-Royce in various R&D related positions, including a leading role in the Company's transition from selling jet-engines, to selling 'power-by-the-hour', and ultimately becoming Chief Engineer responsible for the company's long term future military engine strategy. He left the company in 1996 to first help set up a high technology company spin-out from Imperial College, London, before entering a programme of systematic innovation research at the University of Bath. He first started using Systematic Innovation in 1992, and by the time he left Rolls-Royce had generated over a dozen patents and patent applications. In 1998 he started teaching Systematic Innovation methods to both technical and business audiences, and to date has given workshops to over 15,000 delegates across a broad spectrum of industries and disciplines. He continues actively use and develop the Systematic Innovation methodology. With over 800 systematic innovation-related papers and articles to his name, plus the best-selling 'Hands-On Systematic Innovation' books, Darrell is now one of the most widely published authors on the innovation subject in the world. He is CEO of Systematic Innovation Ltd, a UK based innovation company with offices and affiliates in India, Malaysia, China, Denmark, Turkey, Australia, US and Austria. Featured in Who's Who in the World, Darrell is now recognised as one of the world's most prolific inventors. He is a Professor at the University of Buckingham in the UK, and Taylor's University in Malaysia.

Abstract/Outline:

The desire to increase the reliability and robustness of engineered systems is subject to the universal laws of the S-Curve: we can improve reliability, availability and life to a certain level, but to go beyond that level demands a discontinuous shift in design methods and strategies. Some engineering systems now demand that designs are not simply robust (capable of surviving extreme conditions) or resilient (capable of adapting to extreme conditions), but now become 'antifragile' such that their exposure to extreme conditions causes the system to become stronger. To achieve antifragile demands several discontinuous jumps in design capability, which in turn means the resolution of several contradictions. The presentation will examine the hierarchical nature of these jumps, the contradictions that require to be solved, and how TRIZ/SI is being used to solve some of the main ones. The presentation will incorporate a number of real-life examples from the world's most reliable and resilient industry – aerospace.

Keynote B

Emerging Issues in Technological Innovation, Entrepreneurship and Management - Positioning leading research to be seminal works

Speaker Name: Jonathan D. Linton
Professor, University of Sheffield
Chair in Operations and Technology Management and Director of the Emerging Technology Supply Chain (ETSC) Management Research Centre
Editor-in-Chief, *Technovation*

Speaker Biography:

Jonathan D. Linton is the Chair in Operations and Technology Management and Director of the Emerging Technology Supply Chain (ETSC) Management Research Centre at the University of Sheffield, Foreign Co-Head of the Science Technology Studies Laboratory of the Higher School of Economics in Moscow, and Editor-in-Chief of *Technovation.* He holds a Ph.D. in Management Science, Schulich School of Business, York University and is a registered professional engineer. Dr. Linton's research focuses on emerging technologies supply chains. He is also well known for his activities in Science, Technology, and Innovation Policy, and emerging technology and sustainable supply chains. In addition to publishing in high impact management journals and trade publications, his interdisciplinary research has been published widely in science and technology journals such as *Nature, Nature Materials, New Biotechnology,* and *Energy Risk.* He is on the editorial boards of *Foresight, Journal of Engineering and Technology Management* and *Technological Forecasting and Social Change*.

Abstract/Outline:

The emerging issues facing innovation and entrepreneruship are considered with a focus on positioning research to be high impact and seminal. This is critical as while although there are many outstanding questions that are novel and important to theory, practice and policy; much of the work being conducted is incremental or even replication of existing work. Authors sometime express frustration at producing work they consider to be very novel and have it summarily discounted by journals. Editors express similar frustrations. The manner in which to position, link and structure research to demonstrate its novelty and relevance is illustrated.

Keynote C

Integrating SI and AI for New Research and Applications

Speaker Name: D. Daniel Sheu
Professor Emeritus, National Tsing Hua University
President, International Society of Innovation Methods
Editor-in-chief, International Journal of Systematic Innovation (SCOPUS indexed)
Area Editor, Computers & Industrial Engineering (SCI indexed, top 4% impact factor)

Speaker Biography:

Daniel has 9 years of industrial experience primarily in the electronic industries with Hewlett-Packard, Motorola, and Matsushita prior to joining National Tsing Hua University as a professor where he served for 23 years. He is Professor Emeritus of National Tsing Hua University and a Visiting Professor at Shanghai Jiao Tong University. Professor Sheu is the President of International Society of Innovation, Editor-in-chief of International Journal of Systematic Innovation, Area editor of Computers & Industrial Engineering in Engineering Design and Innovation Methods. He has expert knowledge in systematic Innovation including TRIZ. He has developed more than 20 new TRIZ^{++} tools. Daniel has taught/facilitated more than 100 sessions of industry training/consulting courses in more than 70 companies. He is a certified TRIZ Expert in Training and problem-solving consultation. Daniel Conducted 24 national/cross-strait conferences and 9 international conferences in the areas related to systematic innovation/Manufacturing Engineering. He has been invited to deliver keynote/plenary speeches 12 times in international conferences and 15 times in national conferences. Daniel published 44 peer reviewed journal papers, 174 conference papers, authored 11 books, and translated 4 books. Daniel holds 10 patents from Taiwan, China, and USA.

Abstract:

Innovation is vital to any entity's survival even flourishment. SI (Systematic Innovation) and AI (Artificial Intelligence) are two major broad branches of modern breakthrough technologies. SI is primarily based on logic science and have nothing to do with quantitative optimization. On the contrary, the software side of AI is primarily based on data science and primarily on optimization. SI and AI do not seem to get together. This talk is about proposed methods to fuse the knowledge of SI and AI for synergetic fusion of SI and AI characteristics expanding to new areas of research and applications

Outline:

- SI characteristics and areas for improvement
- AI characteristics and limitations
- Elements for integrating SI and AI
  - How AI can help SI developments
  - How SI can help AI developments
- Summarize new directions for SI+AI researches and applications

Special Speech A

The Digital and Social Foundations of Collaborative Innovation in SMEs

Speaker Name: Andrew Lyons
Professor, University of Liverpool
Head of the Operations & Supply Chain Management Subject Group, University of Liverpool Management School
Editor-in-Chief, *International Journal of Logistics: Research & Applications*

Speaker Biography:
Andrew Lyons is Professor and Head of the Operations & Supply Chain Management Subject Group at the University of Liverpool Management School. Professor Lyons has wide-ranging research interests in operations strategy and supply chain design, and has published over 60 articles in the areas of operations and supply chain management including Customer-Driven Supply Chains, a book published in 2012.He is a visiting professor at the Universities of Valencia and Grenoble. He is also a member of CILT and has worked as a consultant and trainer, and provided research support to several dozen manufacturing businesses.

Abstract/Outline:
Most SMEs have insufficient resources and expertise to innovate beyond repeating previous incremental successes. The nature of innovation is increasingly recognised as a shared one and new innovations that lead to step changes in performance increasingly demand that SMEs collaborate. SMEs can and should use external ideas as well as those generated internally in order to advance their products and processes. Vertical collaboration is concerned with partnerships formed along a linear, upstream-downstream supply chain. Conventional customer-supplier relationships are vertical in nature. Horizontal collaboration is a growing trend in contemporary supply chain design. It concerns collaboration between organisational entities providing the same or similar service. Horizontal collaboration can be "co-opetitive" – collaboration between competitors. Effective collaborative innovation is dependent on well-structured social as well as digital networks, the design of which help redefine the boundary between an SME and its surrounding environment, making it more porous and integrated into loosely-coupled networks of different organisations, collectively and individually working toward boosting performance and commercialising new knowledge.

Special Speech B

Disruptive Innovation: New Processes and Methods

Speaker Name: Runhua Tan
Professor, Hebei University of Technology
Director of the National Engineering Research Center for Technological Innovation Method and Tool
Chair of the Chinese Society of TRIZ
Chair of the Chinese Specific Society for Technological Innovation Method

Speaker Biography:
Professor in the school of mechanical engineering (1996-), Director in the National Engineering Research Center for Technological Innovation Method and Tool (2013-), Hebei University of Technology. He graduated in the Department of Mechanical Engineering, Zhejiang University, with the Ph.D. in 1998. He is an editorial board member of Chinese Journal of Mechanical Engineering, Computer Integrated Manufacturing System, Chinese Journal of Engineering Design, Journal of Machine Design. He is the chair of Chinese Society of TRIZ (2005-), chair of Chinese Specific Society for Technological Innovation Method. Published many papers and ten books and most of them are related to TRIZ development and application in industries. Won the Altshuller Medal, 2016, Altshuller Institute, USA.

Abstract/Outline:
Disruptive Innovation has been put forward for many years in the world. But the processes to implement the goal of the disruptive innovation are always in being studied especially in the field of engineering. The first step for new product developemnt is the design. There are many models for design processes used in industries in China. The most of them are influnced by Pahl & Beitz' design methodology. It is clearly an important research topic that to make an integeration among resrach results of disruptive innovation, TRIZ and Pahal & Beitz's methodology to form a few new processes and methods to implement the goal of disruptive innovation. The presentaion shows some research results related to the reatrch topic in this center. In the past years we have made the integration and to form new processes and methods. The classical TRIZ has been applied to solve inventive problems in the process of integeration. Our new processes and methods have been applied to train many innovative engineers for the compnies in different regions in China.

Presentation Guidelines

1. To find the TIME AND LOCATION of the session if you have a PRESENTATION or are the SESSION CHAIRS;
2. The time for oral presentation is 12 minutes followed by 3-minute questions and answers (Q & A) session;
3. 3. Please be in smart casual and arrive at their presentation venue at least 15 minutes prior to designated session.
4. Please save your presentation file in a USB memory stick rather than connect your own laptop.
5. Please give your presentations in Microsoft PowerPoint or Adobe Acrobat Reader.

ICSI Parallel Sessions

Sessions for Tuesday, 09th July 15:00-17:00
Location: Seminar Room 3, South Campus Teaching Hub (SCTH) Building
Session Chairs: Darrell Mann; Paul Frobishe

Time	ID	Paper Title	Author(s)
15:00-15:15	7	Is TRIZ a new catalyst for creative AI?	Aleksei Ruin, Andrii Konovalenko
15:15-15:30	9	Conceptual foredesign of functional systems	Evgeniy Smirnov
15:30-15:45	10	Research on Technology-function Matrix Construction for Patent Layout	Chuan He, Runhua Tan, Peng Shao, Wendan Yang
15:45-16:00	69	Analyzing Environmental Continuous Improvement (e-CI) in Japanese Manufacturing Industry by Data Envelopment Analysis	Rena Ohara, Koichi Murata
16:00-16:15	28	An Integrated TRIZ-Based Approach to Product Innovation for Collaborative Design Process	Tien-Lun Liu, Ming-Cheng Tsai
16:15-16:30	27	A systematic approach for achieving sustainability-oriented innovation in Indonesia: An empirical study	Budi Harsanto, Niraj Kumar, Yuanzhu Zhan, Roula Michaelides
16:30-16:45	70	A Fundamental Study on Evaluation of Work Sharing Plan by Analytic Hierarchy Process	Shigemasa Kasahara, Koichi Murata
16:45-17:00	18	Applying Lean Sigma approach to develop an innovative Write Test Machine (iWTM) in Testing, Inspection and Certification Industry	C. H. Li, S. L. MAK, S. K. LAW, W. H. SZE, Fanny TANG
17:00-17:15	25	Strategic Approach for the Implementation of New ISO/IEC 17025:2017 Quality Management Systems: A Review on Risk Management and Data Management	Fanny Tang, SL Mak, Jimmy Li

Sessions for Tuesday, 09th July 15:00-17:00
Location: Seminar Room 4, South Campus Teaching Hub (SCTH) Building
Session Chairs: Hicham Chibane; Shu-Lun Mak

Time	ID	Paper Title	Author(s)
15:00-15:15	16	Nuclear Fusion in a Quintuple Helix Innovation Ecosystem	Elias G. Carayannis, John Draper, Ion A. Iftimie
15:15-15:30	79	Linking Managerial Coaching with Innovative Work Behaviors of Employees through Affective Supervisory Commitment	Muhammad Ali, Basharat Raza, Nazish Imtiaz
15:30-15:45	14	User-driven Innovation, Dynamic Capability and Business Model Evolution of the Tea supply Chain	Yanhua Sun, Yufang Zhang, Yu Gong
15:45-16:00	15	Exploring a Social Media Crowdsourcing Data-Driven Approach for Innovation	Hannah Forbes, Ji Han, Dirk Schaefer
16:00-16:15	21	The Impact of Social Media on Value Co-creation in Sporting Event	Haoyu Liu, Kim Hua Tan, Kulwant Pawar
16:15-16:30	22	Re-evaluating Customer Feedback: The Gap between Online Product Ratings and The Expressions of Sentiment in Review Contents	Youngseok Choi, Yu-Lun Liu, Changwoo Suh, Jiayao Hu
16:30-16:45	11	Health 4.0: How Digitisation Drives Innovation in the Healthcare Sector	Bahar Khayamian Esfahani, Melania Bause, Dirk Schaefer
16:45-17:00	83	The impact of entrepreneurship education on entrepreneurial intentions among students in Pakistan	Muhammad Ali, Yasir Iftikhar, Sarmad Ejaz, Rizwan Danish, Fawad Ali
17:00-17:15	76	A new way to classify physical effects based on Wikipedia	Pei Zhang, Denis Cavallucci, Cecilia Zanni-Merk

Sessions for Wednesday, 10th July 14:10-17:00
Location: Seminar Room 3, South Campus Teaching Hub (SCTH) Building
Session Chairs: Elias G. Carayannis; Yu Gong

Time	ID	Paper Title	Author(s)
14:10-14:25	45	Exploring and Evaluating Pressure Measurement Methods for Food Extrusion in Cake Decoration with Systematic Innovation Method	Jo-Peng Tsai, Yu-Gang Chen, Min-Fa Chiu
14:25-14:40	8	Reverse Effect and Resource Database	Yu-Shuo Fan, Dongliang Daniel Sheu
14:40-14:55	60	Prioritized Effect Identification for Problem Solving Based on Fuzzy Identification	Jealousy Hong, D. Daniel Sheu, MC Chiu
14:55-15:10	38	New Approach to Respiratory Rate Measurement using TRIZ	TriZit Benjaboonyazit, Tayard Desudchit
15:10-15:25	47	Design Development for Pressure Vessel Product Using Fuzzy QFD, DEA and TRIZ	Mei-Hwa Chen, Hsin Rau, Po-Tsang Huang
15:25-15:40	57	Development of a Portable Seating Assist Device	Yu-Gang Chen, Jo-Peng Tsai
15:40-16:00	*Coffee Break*		
16:00-16:15	49	A Methodology to identify noise that causes tinnitus	Shan Yang Wang, Chia-Nian Shyi
16:15-16:30	54	Integrating Systematic Innovation Method and Fuzzy Markup Language on the Application of the Pastry Tips Selection	Jo-Peng Tsai, Li-Wei Chen, Sung-Bao Yang
16:30-16:45	59	Systematizing Application Range of Visual Management by Advanced Digital Technologies	Koichi Murata
16:45-17:00	71	A Study on Systematic Design of Key Performance Indicators in the Era of Internet of Things	Takahiro Tamura, Koichi Murata
17:00-17:15	87	Measuring Wine Preferences by Ensemble Learning from physicochemical properties	Shuai Luo, Rui Ma, Yichuan Wang, Minhao Zhang

Sessions for Wednesday, 10th July 14:10-17:00
Location: Seminar Room 4, South Campus Teaching Hub (SCTH) Building
Session Chairs: Jiayao Hu; Muhammad Ali

Time	ID	Paper Title	Author(s)
14:10-14:25	34	Employee aging, workforce diversity and two modes of innovation	Jisung Park, Seongsu Kim
14:25-14:40	44	Mass-Engineer-Invention Driving Innovation: A Pattern of Technology Transfer For Low Cost Innovation In Industries In China	Runhua Tan, Junlei Zhang, Xiangdong Li, Qian Xin
14:40-14:55	77	The State of New Product Introduction Delays: A Systematic Literature Review and Guidance for Future Research	Matt Mitchell
14:55-15:10	46	From optimization till contradictions resolution related to the process of machining composite materials	Hicham Chibane, Sébastien Dubois, Roland De Guio
15:10-15:25	68	Development of Online Collaboration Tools (OCT) for Collaborative Innovation Design	Zhao Yu, Zhi-nan Zhang
15:25-15:40	84	On the Policy Orientation of CPEC in Pakistan: A Cynical View	Zafar Amad
15:40-16:00	*Coffee Break*		
16:00-16:15	74	An analysis of port competition from hinterland transport chain perspective	Jiajia He, Dongping Song, Andrew Lyons
16:15-16:30	19	A Study on Application of Additive Manufacturing in Testing and Certification Industry	S. L. Mak, W. F. Tang, C. H. Li, H. K. Lau

16:30-16:45	82	Organizational learning capability, innovation and performance: study in small and medium-sized enterprises (SMEs)	Shahid Hafeez, Hafiz Fawad Ali, Rizwan Qaiser Danish
16:45-17:00	85	The decade of innovation method in China: experience, challenges and prospects	Haiyan Wang, Hongli Liang
17:00-17:15	20	Patent Circumvention Strategy Based on CAFÉ-TRIZ ——A Case on Wire Guide Holder	Wei YAO, Zhaowei CHU, Shunshun HU, Xu HAN

Sessions for Thursday, 11th July 09:00-10:30
Location: Seminar Room 3, South Campus Teaching Hub (SCTH) Building
Session Chairs: Hsin Rau; Tien-Lun Liu

Time	ID	Paper Title	Author(s)
09:00-09:15	63	Testing the impact of Systematic Innovation training in the NHS	John Sainsbury, Pauline Found, John Bicheno, Darrell Mann
09:15-09:30	65	A Strategic Innovation Model of Innovation	Paul Frobisher
09:30-09:45	66	TRIZ Learning from Teaching	Paul Frobisher
09:45-10:00	80	Application of TRIZ on Multifunctional integrated desk and chair	Pei-Hsi Liu , Zheng Hao Chen, Meng Wei Ye , Zi-Qi Liu, Chen-Hui Wu, Xie-Zhi Sheng
10:00-10:15	31	TRIZ Based Systematic Patent Circumvention and Regeneration Methods	D. Daniel Sheu, Yao-Ting Wang
10:15-10:30	81	The 7 Pillars of TRIZ++ Philosophies	D. Daniel Sheu, Dimitri Cayard, M.C. Chiu
10:30-10:45	72	Two Aspects of Function for Technical System	Yong Won Song

Sessions for Thursday, 11th July 09:00-10:30
Location: Seminar Room 4, South Campus Teaching Hub (SCTH) Building
Session Chairs: Seongsu Kim; M.C. Chiu

Time	ID	Paper Title	Author(s)
09:00-09:15	43	A New Process Model for Technology Forecasting	Kang Wang, Runhua Tan, Wendan Yang, Jianguang Sun, Mengyu Chen
09:15-09:30	61	An Innovative Improvement Case Study for Traffic Regulation Activity of Military Camp Opening to the Public	Lin Youn-Jan, Jo-Peng Tsai, Jyhjeng Deng, Lin-Wei Kao, Cheng-Tai Chuang
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Paper ID : 07

Is TRIZ a new catalyst for creative AI?

Aleksei Ruin[1*], Andrii Konovalenko[2]
Innovating cloud
E-mail(s): admin@innovatingcloud.com

Abstract

Systematic approach and viewpoint of Theory of Inventive Problems Solving (TRIZ) has made it a very promising candidate for the internal mechanics of creative Artificial Intelligence (AI). It won't be a basis for a so-called strong AI but might be a good first step in problem-solving AI development.

In this paper authors propose a blueprint for an automated engineering (and in the future non-technical) problem solver which is a neural network(s) (NN) having been trained on thousands of known inventions able to propose solutions for textual descriptions of the engineering problems proposed by a user.

Authors will also shed a light on the first experiments with pre-alpha/alpha datasets and neural networks which required Amazon Mechanical Turk human intelligence intervention and extensive trials with the network architectures.

The best NN trained with about a ten thousand lines long dataset has achieved 32% accuracy which in our context means in 32% of the engineering problems the network was able to propose the same Inventive Principle as a professional TRIZ practitioner.

Keywords: Artificial Intelligence, Inventive Principles, Neural networks, TRIZ.

Paper ID : 08

Reverse Effect and Resource Database

Fan, Yu-Shuoa[1], Sheu, D. Daniel[2*]
Department of Industrial Engineering and Engineering Management,
National Tsing Hua University, Taiwan
E-mail(s): dsheu@ie.nthu.edu.tw

Abstract

In contrary to traditional scientific effects and resources database, this research established a set of reverse effect and reverse resource databases with user-friendly excel-based software for patent regeneration, patent enhancement, and identification of cross-industry application opportunities for a new product or technology. The user can provide an effect or a resource from their interested patent, product, or technology as input data to generate an output of generic functions that this resource/effect can achieve or generate an output of generic attributes that this resource/effect can change or maintain. The database, which developed in this paper, is divided into four parts, which are: (1) Effect-Generic Functions Database, and (2) Effect-Generic Attributes Database (3) Resource-Generic Functions Database, (4) Resource- Generic Attributes Database. The database applications include but not limited to the following: (1)"Cross-field" patent regeneration, (2) "Cross-field" applications of innovative products or technologies, and (3) Generalize a patent function into its upper-level more generic functions so as to expand the scope of a patent.

Keywords: systematic innovation, TRIZ, Function-Oriented Search, Scientific Effects Database, Resources Database

Paper ID : 09

Conceptual foredesign of functional systems

Evgeniy E Smirnov
St. Petersburg International Public University of TRIZ, Saint Petersburg, Russia
E-mail(s): triz-on@mail.ru

Abstract

Today's fast-developing world requires a special method to the evaluation of future events. Conventional expert approaches often do not allow to obtain an acceptable result, since they use linear techniques that do not take into account the emergence of new technologies.

For this purpose, in contemporary TRIZ there is a section that includes the trends of functional systems evolution. But the existing ways to work with trends, unfortunately, are not sufficiently algorithmized. So, it is necessary to rely either on intuition, or on passing through all conceivable options of changes. This makes it very difficult to evaluate ideas, and can lead to the fact that some of the ideas will be missed.

In the paper a systematic algorithm for conceptual foredesign of functional systems is offered. The algorithm is based on:

(1) conceptual modeling of real objects as functional systems;

(2) triple analysis of the models with decomposition of form, structure and functions;

(3) life cycle analysis of considered systems and evolutionary cycle analysis of the systems as classes;

(4) analysis of functional super-systems and the immediate environment as well as stakeholders.

A visual representation of the structure of key trends of systems evolution and the principle of their application to the modification of functional systems are also considered.

Keywords: TRIZ, conceptual foredesign, prediction, functional system, evolution trends, trends of functional systems evolution

Paper ID : 10

Research on Technology-function Matrix Construction for Patent Layout

Chuan He, Runhua Tan · Peng Shao, Wendan Yang
Hebei University of Technology.
E-mail(s): chuan_river@163.com

Abstract

Technology-function matrix (TFM) is one of the most important methods of patent layout. The establishment of the TFM can help enterprise managers to make technology layout and market decision. In order to realize the information visualization and automatic construction of TFM, most of the researches focus on sematic annotation technology. The data for the construction of TFM are published patents. But research on the relationship between patents and TFM is insufficient. Considering the deficiency of current research, based on customer requirements and technology life cycle propose an approach for establishing TFM. First, through improved Kano model access the customer requirements, then through the technology life cycle diagram to narrow the technology field, and establishing the TFM. An engineering case is provided to verify the feasibility of the approach.

Keywords: customer requirements, patent layout, technology-function matrix, technology life cycle,

Paper ID : 11

Health 4.0: How Digitisation Drives Innovation in the Healthcare Sector

Bahar Khayamian Esfahani*, Melania Bause, Dirk Schaefer
University of Liverpool, School of Engineering, Division of Industrial Design
E-mail(s): melania.bause@liverpool.ac.uk; b.khayamian-esfahani@liverpool.ac.uk*;
dirk.schaefer@liverpool.ac.uk

Abstract

Driven by networked Electronic Health Record systems, Artificial Intelligence, real-time data from wearable devices with an overlay of invisible user interfaces and improved analytics, a revolution is afoot in the healthcare industry. Over the next few years, it is likely to fundamentally change how healthcare is delivered and how the outcomes are measured. The focus on collaboration, coherence, and convergence will make healthcare more predictive and personalised. This revolution is called Health 4.0. Data portability allows patients and their physicians to access it anytime anywhere and enhanced analytics allows for differential diagnosis and medical responses that can be predictive, timely, and innovative. Health 4.0 allows the value of data more consistently and effectively. It can pinpoint areas of improvement and enable decisions that are more informed. What it also does is help move the entire healthcare industry from a system that is reactive and focused on fee-for-service to a system that is value-based, which measures outcomes and ensures proactive prevention [REF]. In this paper, the authors discuss how digitisation is paving the way for data-driven innovation in the healthcare systems. They elaborate on the opportunities and challenges for all stakeholders involved and discuss how emerging technologies can help overcome the inherent rigidity of today's healthcare ecosystem. Following on from this, the authors explain the importance of research on the actual design of smart healthcare products and product service systems of the future and the challenges faced from the viewpoint of design practice.

Keywords: design research, health 4.0, health services, innovation, digitization.

Paper ID : 14

User-driven Innovation, Dynamic Capability and Business Model Evolution of the Tea supply Chain

Yanhua Sun[1], Yufang Zhang[1], Yu Gong[2]*
[1]Business School of Hunan Agricultural University, Hunan Agricultural University, Changsha, China
[2]Southampton Business School, University of Southampton, Southampton, UK, SO17 1BJ
E-mail(s): sunynxh@aliyun.com; 894165143@qq.com; y.gong@soton.ac.uk

Abstract

Using a single case study approach, this paper explores how key core tea supply chain companies perceive opportunities, integrate internal and external resources, and restructure resources to promote the evolution of supply chain business models. The results show that: (1) the end-user innovation drive is the precondition for the evolution of the tea supply chain business model; (2) the user-driven innovation leads to the change of the supply chain core enterprise dynamic capability (environmental awareness, resource integration capability, resource reconstruction capability) and the tea supply chain network structure (membership, structure) changes, and thus promote the tea supply chain business model evolution (optimization). (3) The evolution (optimization) of the supply chain business model will in turn enhance (accumulate) the core dynamic capabilities of the core enterprise (environmental awareness, resource integration, resource reconfiguration) and promote the change of tea supply chain network architecture (membership, structure).The research suggests that the supply chain should pay attention to the construction of core enterprise dynamic capabilities, and pay attention to the maintenance of the relationship between core enterprises and upstream and downstream members, so that the members of the supply chain are consistent with the core enterprise goals. Ultimately, the entire supply chain business model is continuously optimized and sustainable.

Keywords: user-driven innovation; dynamic capability; tea supply chain; business model evolution

Paper ID : 15

Exploring a Social Media Crowdsourcing Data-Driven Approach for Innovation

Hannah Forbes, Ji Han, Dirk Schaefer
Division of Industrial Design, University of Liverpool
E-mail(s): hannah.forbes@liverpool.ac.uk; ji.han@liverpool.ac.uk; dirk.schaefer@liverpool.ac.uk

Abstract

Innovation is connected with creativity through design, but generating creative ideas is always challenging. In recent years, a number of computational tools have been developed to support designers in creative idea generation. However, these tools often employ existing databases, such as the WordNet, or customized databases containing a limited number and variety of data. Therefore, the performance of these computational tools is constrained by their current databases as well as working principles. Knowledge is considered a significant resource in supporting innovation. Crowdsourcing outsources tasks traditionally performed in-house to the crowd and uses external knowledge to solve problems and democratize innovation. Social media is a vital tool used in crowdsourcing that allows users to create and share knowledge online. Despite the proven value of crowdsourcing in other domains, an approach to crowdsourcing in product development is yet to be presented in literature. This paper proposes a novel approach using crowdsourcing on social media platforms to acquire knowledge from the crowd to support designers in generating creative ideas for product design and development, and ultimately leading to innovation. The process starts with posting an open call on a design challenge on social media platforms. Social media users, referred to as the crowd in this study, are encouraged to participate to solve the design challenge through posting solutions using descriptive texts. This data is then crawled, by employing data mining techniques, and analyzed through using natural language processing tools. The processed data, which is known as crowd knowledge in this study, is then provided to designers for supporting the generation of creative design ideas. Limitations and challenges of implementing this approach into computational tools as well as using this approach are discussed to provide insights and directions for future research.

Keywords: Creativity, crowdsourcing, data-driven design, innovation, social media.

Paper ID : 16

Nuclear Fusion in a Quintuple Helix Innovation Ecosystem

Elias G. Carayannis[1], John Draper[2]*, and Ion Iftimie[3]
[1]George Washington University School of Business
[2]Research Group on Local Affairs Administration and Smart City Development, Khon Kaen University
[3]Central European University
E-mail(s): caraye@gwu.edu; *johndr@kku.ac.th; Iftimie_Ion@phd.ceu.edu

Abstract

In November of 2018 the U.S. National Academies of Sciences, Engineering, and Medicine's Report of the Committee on a Strategic Plan for U.S. Burning Plasma Research emphasized the role of the private sector in the process of nuclear fusion innovation. The Report's main recommendation triggered the creation of the Fusion Industry Association, illustrating a shift into how the United States and its partners could introduce a new primary energy source to gradually replace fossil fuels and address the 'super wicked problem' of global warming in the process. This paper introduces the Quadruple and Quintuple Innovation Helix inter-disciplinary and trans-disciplinary frameworks of analysis and discusses how entrepreneurship and innovation can contribute to the development of nuclear fusion. The two frameworks are currently being used across fields to promote fractal, multi-level, multi-modal, multi-nodal, and multi-lateral approaches to accelerate innovation diffusion, increase the quality of democracy, and protect the natural environment (socio-ecology). We propose that managed co-opetive global solutions are critical in the nuclear fusion innovation and diffusion processes and that the emerging role of the private sector in the field can help enable new options to develop technologies critical for mitigating climate change.

Keywords: climate change mitigation, global warming, nuclear fusion, private sector, Quintuple Innovation Helix, super wicked problem

Paper ID : 18

Applying Lean Sigma approach to develop an innovative Write Test Machine (iWTM) in Testing, Inspection and Certification Industry

C. H. Li[1], S. L. MAK[2], S. K. LAW[3], W. H. SZE[4], Fanny TANG[5]
School of Science and Technology, The Open University of Hong Kong, Hong Kong, China
E-mail(s): chli@ieee.org[134]; lunmak@ieee.org[2] ; fwftang@ouhk.edu.hk[5]

Abstract

Lean Sigmais an integrated systematic approach to apply lean manufacturing concept for evaluating seven wastes in production process and use six sigma tools for analyzing any process variations in machinery operationsin the past two decades.Testing, inspectionand certification(TIC)industry is one of the major stakeholders in manufacturing supply chainto provide the international testing requirements,verify the product safety in product development processand sustain high performance of production management system in production plant. Most of the researchers focus on the applications of Lean Sigmain manufacturing plantsbut seldom consider the effectivenessof testing machines in testing and certificationlaboratories. The purpose of this research appliesLean Sigmain case study to assess any potential problems on current testing machines, develop an innovative machine for shooting engineering issuesand validate machinery performancesin testing and certification industry. The authors hope this research can provide some insights in terms of productivity, reliability and safety in manufacturing and TIC stakeholders.

*Keywords:*Lean Sigma, productivity and reliability, write test machine, testing and certification

Paper ID : 19

A Study on Application of Additive Manufacturing in Testing and Certification Industry

S. L. Mak[1], W. F. Tang[1] C. H. Li[1], H. K. Lau[2]
[1] School of Science and Technology, The Open University of Hong Kong, Ho Man Tin, Kowloon, Hong Kong SAR, China
[2] Hong Kong Institute of Vocational Education (Tsing Yi), Tsing Yi Island, New Territories, Hong Kong SAR, China
E-mails: lunmak@ieee.org; fwftang@ouhk.edu.hk; chli@ieee.org; hklau@ieee.org

Abstract

Additive manufacturing (commonly known as 3D printing) was developed since 1987 and rapidly developed in the past ten years. Additive manufacturing is one of key technologies in the framework of Industry 4.0. The America Society for Testing and Materials (ASTM) technical committee F42 approved a list of seven additive process categories, including (1) material extrusion; (2) material jetting; (3) binder jetting; (4) sheet lamination; (5) vat photo-polymerization; (6) powder bed fusion; and (7) directed energy deposits. Due to the patent expiry of Fused Deposition Modelling (FDM) and Day light Processing (DLP), the cost of FDM and DLP machines drops significantly and have becomes the most popular type of machines for home users. Polymeric material such as polylactic acid or polylactide (PLA) is commonly used to make the filaments for producing the product in FDM. The (liquid) photopolymer resin is used in the DLP machine. PLA material is a kind of biodegradable thermoplastic material derived from renewable resources, such as corn starch, cassava roots, chips or starch. Meanwhile, test gauges are widely used in the testing and certification industry for the measurement of dimensions of consumer products. This paper explored the feasibility of application of additive manufacturing technology to make the test gauges.

Keywords: Additive Manufacturing, Fused Deposition Modeling, test gauge, testing and certification.

Paper ID : 20

Patent Circumvention Strategy Based on CAFÉ-TRIZ ——A Case on Wire Guide Holder

Wei YAO, Zhaowei CHU, Shunshun Hu, Xu HAN
Institute of China's Science, Technology and Education Policy,
School of Public Affairs, Zhejiang University, Hangzhou, China
E-mail(s): chuzhaowei0312@163.com; ywzju@126.com

Abstract

Patents are one of the key factors for companies to keep advantages in market competition. Patent circumvention is a strategy by using innovative methods to reasonably circumvent competitors' patents, to help companies to avoid the risks of patent infringement. The CAFÉ-TRIZ theory transfers technical problems to Constrains(C) and breaks constrains by manipulating on Attributes(A) and Functions(F), to solve problems by scientific Effects(E) finally. Based on Oxford Effects Database and TOC theory, CAFÉ-TRIZ theory combines the advantages of Classical TRIZ, ASIT, USIT. Engineers can grasp CAFÉ-TRIZ easily to generate conceptual solutions efficiently. Based on research before, CAFÉ-TRIZ could generate ideas 50% more than classical TRIZ, which can also be used in patent circumvention. "Guide wire holder" is a critical medical device frequently used in ERCP. The patent of "guide wire holder" was protected strictly by a patent family and held same patent in many countries. Taking the most core and protected patent as an example, this paper used CAFÉ-TRIZ to carry out patent circumvention, and finally produced about 20 conceptual ideas and five potential patent circumvention ideas.

Keywords: Patent Circumvention, CAFÉ-TRIZ, Wire Guide Holder

Paper ID : 21

The Impact of Social Media on Value Co-creation in Sporting Event

Haoyu Liu*, Kim Hua Tan**, Kulwant Pawar***
The University of Nottingham, Nottingham, NG8 1BB
E-mail(s): haoyu.liu@nottingham.ac.uk*; kim.tan@nottingham.ac.uk**;
kulwant.pawar@nottingham.ac.uk**

Abstract

Recent years, we have witnessed that the social media becomes an increasingly important channel for a sporting event, which enables fans to play a more active role as service value co-creator. Although these new media threaten the traditional sporting event supply chain and operations strategies, it also provides opportunities for growth through new adaptive supply chain and strategies. This paper uses Service-Dominant Logic (SDL) co- creation concept and the diffusion of innovation theory to investigate the impact of social media on fans value co-creation in sporting event. Data from the Chinese social media Weibo and its market report was collected and analysed. The findings reveal social media plays a key role as service innovation in the modern sporting event media supply chain. The paper further identifies three impacts of social media on the fans value co-creation: (a) fans participation; (b) fans experience; and (c) fans consumption motivation.

Keywords: Weibo; FIFA World Cup; Social Media; Service Innovation; Sporting Event; Value Co-creation

Paper ID : 22

Re-evaluating Customer Feedback: The Gap between Online Product Ratings and The Expressions of Sentiment in Review Contents

Youngseok Choi[1], Yu-lun Liu[2], Changwoo Suh[1], Jiayao Hu[3*]
[1]Brunel University London
[2]University of Kent
[3]Coventry University
E-mail(s): jiayao.hu@coventry.ac.uk*

Abstract

The existing information systems and consumer studies on the functional aspect of 'reputation systems' have two streams: the 'rating systems' and the 'review content systems'. Both systems are offered by most of the popular e-commerce retailers to enhance customer communication experiences. However, there is limited research on the relationship between customers' rating scores and the sentiments expressed in their review contents, which significantly affect the reliability of the overall review in the reputation systems. A computational linguistics approach (Semantic orientation approach) using Amazon's (UK) product review data (34,621 reviews) is employed to unveil the gap between the numerical ratings and the sentiments of review contents from the two reputation systems. Results show that although customers give the same high rating for products that have a lower/higher overall rating, the customers' expressions of sentiment in the review content are actually less/more positive, compared to products that have a higher/lower overall rating.

Keywords: Rating, Reputation system, Review Contents, Sentiment, Semantic Orientation Approach (SOA)

Paper ID : 25

Strategic Approach for the Implementation of New ISO/IEC 17025:2017 Quality Management Systems: A Review on Risk Management and Data Management

Fanny Tang, SL Mak, Jimmy Li
School of Science and Technology, The Open University of Hong Kong, Hong Kong
E-mail(s): fwftang@ouhk.edu.hk; slmak@ouhk.edu.hk; jchli@ouhk.edu.hk

Abstract

In the world of international ISO standards, ISO/IEC 17025:2017 is recognized because recognized as the new standard for the "General Requirements for the Competence of Testing and Calibration Laboratories". ISO/IEC 17025:2005 been used by industries for twelve years since the 2005 version was published. The standards in 2005 version are obsoleted and a replacement standard in version 2017 has been printed and in situ. With this, a variety of laboratories are affected with vital impact on their quality management system particularly in terms of knowledge management and risk management. The study outlines the major changes within the new revision. Concerning lots of data are increasingly produced every day in laboratories, Big Data as a fundamental tool of treating such data in the new version of standards are discussed.

Keywords: Accreditation, Big Data, Strategic Management, Test Standards, Risk Management

Paper ID : 27

A systematic approach for achieving sustainability-oriented innovation in Indonesia: An empirical study

Budi Harsanto[1], Niraj Kumar[1], Yuanzhu Zhan[1], Roula Michaelides[2]
[1]University of Liverpool Management School; [2]Manchester Metropolitan University Business School
E-mail(s): harsanto@liverpool.ac.uk

Abstract

Sustainability-oriented innovation (SOI) is attracting widespread interest due to growing discussion over global warming and economic inequality. The aim of this paper is to understand how firms approach SOI and develop a systematic approach towards developing SOI in the manufacturing firm. The design of this study is qualitative, conducting semi-structured interviews to owners and managers in Indonesia. Indonesia was chosen as the context of the study because, as the fourth largest population in the world, it possesses the characteristics of developing countries that face the challenges of innovation and sustainability. Data is analysed using thematic analysis, which is then connected with the dynamic capabilities theory, as the main theoretical underpinning in this study. The findings suggested that only a few firms are adopting SOI in more advanced capacities than others (8 out of 25 firms). By looking at these few companies, we then analyse the systematic ways of developing SOI from a capabilities perspective. We found that there are four stages to becoming a more sustainable innovator. The first stage is related to firm motivation and the next three stages are about dynamic capabilities, where companies need to develop their SOI sensing, seizing, and reconfiguring through several micro foundations. This paper makes several contributions. Firstly, it contributes to SOI literature by analysing SOI from the capabilities perspective, which highlighted seminal reviews of SOI as potential areas of interest. Secondly, this paper contributes to creating a more systematic way of being a sustainable innovator, so that it is expected to provide benefits academically and practically. Thirdly, this paper contributes to SOI studies in emerging economies, which are currently rare.

Keywords: systematic innovation, sustainability-oriented innovation, qualitative

Paper ID : 28

An Integrated TRIZ-Based Approach to Product Innovation for Collaborative Design Process

Tien-Lun Liu[1], Ming-Cheng Tsai [2]
[1 2] Department of Industrial and Systems Engineering, Chung Yuan Christian University
E-mail(s): [1]tliu@cycu.edu.tw; [2]caiming841216@gmail.com

Abstract

For more competitive industrial environment and shorter product lifecycle, the product development process has to be efficient to achieve design innovation. In this paper, authors proposed a product development approach in a "starting-with-the-end" manner after collecting all the development team members' requests for product design. Such process model is named as "Expected-Final-Result (EFR)"-based product development. The concept of EFR is inspired by Ideal Final Result in TRIZ. However the definition is different, then the design conflicts occurred during the process are modeled through evolutionary trends and contradiction analysis in TRIZ. The evolved benefits are used to make relations to possible engineering parameters and then handled by means of contradiction analysis. By identifying the conflicts and once resolved, the product may accomplish a distinct innovation. A design quantitative evaluation strategy for the overall quality is discussed as well.

Keywords: collaborative product design, engineering parameters, ideality, trends

Paper ID : 29

Cross-board Detection Based on Convolutional Neural Network

Yih-Lon Lin[1], Yu-Min Chiang[2]*, and Hsiang-Chen Hsu[3]
[1]Department of Information Engineering, I-Shou University, Taiwan
[2]Department of Industrial Engineering and management, National Quemoy University, Taiwan
[3]Department of Industrial management, I-Shou University, Taiwan
E-mail(s): ymchiang@nqu.edu.tw

Abstract

Current trends in the electronics products are towards miniaturization of components, high functionality, and denser packing of printed circuit boards (PCB). The technology of surface mounted technology (SMT) facilitates this trend, thus it becomes the core of electronics production. During the circuit board manufacturing process, the equipment usually generates more defects when working with smaller boards. To minimize these defects and improve throughput of the manufacturing process, many companies use a process called panelization, resulting in a PCB panel. However, some boards on the panel are defective and will be drawn with a cross mark, called cross-boards or X-boards. In the beginning of SMT process, the cross-boards should be detected first to avoid further processing. Traditionally, the detection of cross-boards is done by manual operation, which is called the labeling process. The labeling error rate is usually high and results in a lot of waste. To reduce the labor cost and improve the efficiency of surface mount assembly processes, this research built a vision system to detect the marker "X" on PCB panel and classify the PCB types by utilizing deep convolutional neural network (CNN). Experimental results indicate the CNN-based vision system can classify the PCB types correctly and detect cross marks.

Keywords: Cross-board, deep convolutional neural network, PCB, SMT.

Paper ID : 30

Joint optimization of tank container over-holding policy and flow network to achieve innovative tactical decision-making

XINJIE XING, DONGPING SONG, PAUL DRAKE
Management School, University of Liverpool
E-mail(s): X.xing3@liverpool.ac.uk, Dongping.song@liverpool.ac.uk, Drake@liverpool.ac.uk

Abstract

Purpose

This research proposes an innovative way to integrate the optimisation of customer over-holding policies and daily operational policies in tank container (TC) operations management. In this market, TCs are used not only for transportation tasks, but commonly as storage equipment for customers' production purposes. Similar to detention and demurrage (D&D) in the dry container (DC) market, customers of TCs are provided with a certain period of buffer time (defined as TC free days) to return the job-finished TCs to the tank container operators (TCOs) with no extra charge. If the free days run out, TC customer over-holding occurs. Although this brings extra profit to the TCOs (similar to D&D influence), it causes negative impacts. Over-holding delays the return of containers, so that the holistic management of container flows is affected. The subsequent low visibility and plan adjustment costs could out-weight the extra profits. Moreover, compared to D&D in dry container operations, TC over-holding makes tank container operations management more difficult. First, it is more common for customers to over-hold TCs for storage and for longer durations. The reason for this lies in the nature of the commodities carried. Typically, the contents of dry containers can be unloaded immediately and placed in a warehouse, but it is not so easy to provide storage for chemicals and using the TC can be the simplest and most cost-effective solution. Second, this issue is less well addressed within the industry as it is perceived as generating large revenues for TCOs, whilst the wider ramifications are ignored. Hence, there is a lack of developed over-holding policies that industry can apply. Third, the various features of the TC business make the over-holding issue more acute. For example, it is more expensive to lease a TC; container return is disrupted by uncertain container cleaning durations; it is more expensive to reposition empty TCs than DCs. Hence, a more innovative approach is needed to design TC over-holding policy with respect to its industrial features. This research then aims to improve TC operations performance through establishing better TC over-holding policies.

Research Approach: This research is structured by the planning level hierarchy. The operational planning level deals with daily operational issues, while the tactical and strategic planning level addresses planning issues over the long-term. Accordingly, a two-stage time-space network model is constructed. The first stage defines the TC over-holding policies, then the second stage embodies operational decisions. Through the evaluation of performance from stage two, decisions made at stage one can be improved subsequently.

Research Impact: Whilst DC operations management has been widely and deeply researched in the literature, there is little coverage of TC operations which are very different in many ways. This paper illustrates how the authors are beginning to address this gap. The study of over-holding also provides a reference point for D&D study in DC research.

Practical Impact: This research draws on real industrial practice that has been studied in a case-study TC operator. Therefore, the results are transferable back to practice. The research provides an innovative method to help TC operators to develop over-holding policies.

Keywords: innovative operation, tank container over-holding, container network flow, empty container repositioning, container cleaning, modelling and optimization.

Paper ID : 31

TRIZ Based Systematic Patent Circumvention and Regeneration Methods

D. Daniel Sheu*, Yao-Ting Wang
Department of Industrial Engineering and Engineering Management
National Tsing Hua University
E-mail(s): dsheu@ie.nthu.edu.tw

Abstract

This research developed a systematic set of patent circumvention, regeneration, and enhancement methods, which include the six stages of: 1) Patent identification; 2) Patent analysis; 3) Patent circumvention; 4) Patent regeneration; 5) Patent enhancement; and 6) Patent infringement comparison judgment. In this paper, we focus on patent circumvention and regeneration using enhanced TRIZ tools such as patent function analysis, Effect/Resource Database, and product-effect-function-value hierarchy to circumvent a patent and possibly regenerate some patentable ideas from an existing patent. Seven elements of any function, in particular feature functions and main functions, of a patent are used as fundamental handles for patent circumvention and regeneration.

The contribution of this work includes: (1) Identifying 7 fundamental elements of patent functions as the object for substitution, addition, subtraction, division and integration toward TRIZ problem solving for patent circumvention, regeneration, and enhancements; (2) Developing product-effect-function-value hierarchy for patent regeneration; (3) Establishing a set of standard forms, descriptions, and examples to facilitate systematic usage.

Keywords: TRIZ, Systematic Innovation, Patent Regeneration, Patent Circumvention, Patent enhancement, six elements of the patent function, Effect/Resource Database.

Paper ID : 32

The Subconscious Projection and Its Creativity

Shwi Chun Wang [1]* , Shan-Yang Wang [2]
Department of Health-Business Administration, Fooyin University, R.O.C. [1]*
Department of Computer Science and Information Engineering, Far East University, R.O.C. [2]
E-mail(s): sc085@fy.edu.tw[1]*, mango@mail.feu.edu.tw[2]

Abstract

Unlike traditional creative rules or logical thinking, the paper presents the creative application of OH card games. It uses the subconscious mind to expand creativity or thinking. In the field of psychological applications, the emergence of card games is mainly focused on consulting technology. Especially when personal thinking is limited and difficult, the proposed card game is more like psychological expansion and emotional release. The card cannot provide answers directly to the user. But in the question and answer mode, the card will display metaphorical information about the problem. In psychological counseling, cards have the added advantage of breaking through psychological impedance and establishing relationships. Ingeniously, according to Jung's Synchronicity theory, this card game can be metaphorically applied to general or technical issues. Even complex problem projections produce metaphors similar to mathematical model transformations or simplifications. Therefore, the three basic steps to produce creativity or to solve thinking difficulties are divided into: (1) mirror image representation of the problem, (2) metaphorical connection or extension of the problem, and (3) integration and answer. In the subjective experience and awareness of the game, this fun way of playing makes creative thinking very simple. At the same time, group games are very affinitive and can use teamwork to find solutions to organizational and cultural issues. This paper will empirically introduce the research process and results through Interview method.

Keywords: creativity, metaphor, OH card, subconscious projection, synchronicity theory

Paper ID : 34

The differentiating effects of workforce aging on exploitative and exploratory innovation: The moderating role of workforce diversity

Jisung Park, Seongsu Kim*
Graduate School of Business, Seoul National University, Seoul, Korea
E-mail(s): intel@snu.ac.kr; sk2@snu.ac.kr*

Abstract

Despite negative predictions about the effects of workforce aging on organizational innovation performance, little systematic research has been conducted on this question. We investigate the differentiating effects of workforce aging by classifying organizational innovation as either exploitation or exploration. More specifically, we suggest that workforce aging positively affects exploitative innovation performance, whereas it negatively influences exploratory innovation performance. Moreover, building on the double-edged effects of diversity, this study examines the moderating role of age diversity in the workforce aging–innovation performance relationship. We predict that the diverse composition in the labor structure contributes only to exploration, not to exploitation. We tested hypotheses using data gathered from a government-sponsored survey of Korean companies—234 firms for exploitative innovation and 166 firms for exploratory innovation. Results revealed that workforce aging had a positive influence on exploitative innovation performance and had an inverted U-shaped relationship with exploratory innovation performance. In addition, age diversity only attenuated the positive workforce aging–exploitative innovation performance relationship. Theoretical and practical implications are also discussed.

Keywords: Workforce aging; Organizational innovation; Exploration; Exploitation; Diversity.

Paper ID : 35

Process of Making Aerated Concrete with Predetermined Density

Jyhjeng Deng[1]*, Youn-Jan Lin[2], Jo-Peng Tsai[3], Teng-Hsuan Lin[4]
[1]Industrial Engineering and Management Department, DaYeh University, Taiwan
[2]Institute of Management, Minghsin University of Science and Technology, Taiwan
[3]Department of Food and Beverage Management, Far East University, Taiwan
[4]Department of Environmental Engineering, DaYeh University, Taiwan
E-mail(s):jdeng@mail.dyu.edu.tw[1*]; yjlin@must.edu.tw[2]; perng@cc.feu.edu.tw[3]; D0305001@cloud.dyu.edu.tw[4]

Abstract

Aerated concrete is a lightweight concrete which can be used in roofing, interior wall construction, muffler filling and the manufacture of hollow ceramic bricks. Thermal and sound insulation properties are its major advantages in these applications. Previous studies showed that sound insulation performance in mufflers is closely related to the density of the aerated concrete but the industry is lacking precise procedures for making aerated concrete with a predetermined density. There are two ways of foaming. One method is the mechanical blending of foaming agents ('profoam' in our case) with water, which normally takes three minutes until the foam is pumped out. After that the foam is poured into cement slurry and the mixture is blended again for a further three minutes. The foam is then entrapped within the slurry and the slurry is expanded. Then the expanded slurry is poured into a mold for further application. The other method is the addition of aluminum powder, which reacts with cement in the slurry, generating hydrogen which is then entrapped in the slurry, causing the slurry to expand. The challenge of the procedure for making a specified density is the foaming and mixing. As for mechanical blending, the density of foam is hard to estimate and can only be estimated through experimentation, by varying the foaming conditions (such as the ratio of foaming agent to water, blending times and even the blending equipment used). With regard to the chemical process, the relationship between the density of the aerated concrete and the ratio of aluminum powder to cement has yet to be investigated. Two recipes for mechanical and chemical foaming are provided. The density of the aerated concrete obtained is 0.789 g/cm3 and 1.003 g/cm3, respectively. A sustainable mold is designed by function analysis and invention principle 22, to convert harm into benefit.

Keywords: Sound insulation, profoam, aluminum powder, density of foam, sustainable mold.

Paper ID : 38

New Approach to Respiratory Rate Measurement using TRIZ

TriZit Benjaboonyazit[1], Tayard Desudchit[2]
[1]Technopreneurship and Innovation Management Program, Graduate School,Chulalongkorn University, Bangkok 10330, Thailand
[2]Division of Pediatric Neurology, Department of Pediatrics, Faculty of Medicine, Chulalongkorn University, Bangkok 10330, Thailand
E-mail(s): TriZit@tni.ac.th[1]; Tayard.D@chula.ac.th[2]

Abstract

In this paper, a new approach to respiratory rate measurement using resonance tube to enhance the performance of microphone is proposed. The microphone is inserted and fixed at the end of the tube in catching breath sound signal from the mouth and/or nose. The signal is amplified and passed into envelope detector circuit after which it is compared with a suitable reference voltage in the comparator circuit to generate a pulse train of square wave synchronized with the respiratory cycle. A simple algorithm is developed in a small microcontroller (PIC16F628A) to detect rising edges of each consecutive square wave to calculate respiratory rate and display it on LCD together with analysis of breathing status. In order to evade noises which will cause errors and artifacts in the measuring system, the reference voltage is creatively designed to intelligently adapt itself to be low during expiration period and to be high during inspiration and pause period using the concept of resolving contradiction in the theory of inventive problem solving (TRIZ). This makes the developed device simple and low-cost with no need for complicated filtering system. It can detect breath sound as far as 250 cm from the nose and can perform accurately and more responsively with wide range of speed and level of breathing as tested against End Tidal CO2 Capnography device. The result shows the developed device can estimate precisely from as low as 0 BrPM to as high as 98 BrPM and is also capable of detecting shallow breathing. It is believed that it has high potentials for detecting hypopnea besides apnea event.

Keywords: Respiratory rate, Resonance Tube, TRIZ, Hypopnea, Capnography..

Paper ID : 39

A Novel Approach on Polygonal Turning

Wei-Fang Chen*, Jung-Nan Chiu and Chia-Chien Liu
49 Zhonghua Rd., Xinshih Dist., Tainan City 74448, Taiwan (R.O.C.),
Department of Mechanical Engineering, Far East University
E-mail(s): wfchen123@gmail.com

Abstract

Screws, nuts, etc. are processed in a polygonal shape. Polygonal shape processing is now widely used in the industry and is widely used. Generally, the shape of the processed polygon is slowly milled, and the polygon shape cannot be cut at one time, and the efficiency is low. Although special machines can be used to process polygonal shapes at one time, equipment is expensive and small factories are difficult to afford. In order to improve the cutting efficiency, the best way is to machine the polygonal shape at one time on any cutting machine. This paper uses a self-made power turret to match the rotation speed of the turret shaft and the workpiece shaft on any lathe to a certain rotation ratio. The turning is approximate to the polygonal shape, and the rapid cutting improves the efficiency.

Keywords: Polygon, lathe, one-time processing.

Paper ID : 40

Innovative Parametric Drawing Design of Roots Blower with Multi-Blade Circular Impeller

Wei-Fang Chen* and Sheng-Ting Chou
49 Zhonghua Rd., Xinshih Dist., Tainan City 74448, Taiwan (R.O.C.),
Department of Mechanical Engineering, Far East University
E-mail(s): wfchen123@gmail.com

Abstract

Roots blower wheel blades have two leaves, three leaves and even multiple leaves. The profile type of the Roots blower impeller is generally divided into three types of leaves, which are arc curves, involutes and cycloids. This paper combines theory with CATIA parametric variables and equation functions. It realizes CATIA parametric drawing and design for multi-blade circular arc type blower. Roots Blower arcuate profile drawing parameters established only once. This method has the functions of drawing, designing and analyzing, and can display the result and interference of the design quickly and instantly. The parametric design can greatly improve the design efficiency of the impeller. The idea of parametric modeling of arc impeller is proposed. Establish the flow of parametric design, drawing and analysis of the impeller.

Keywords: Roots blower, impeller, parametric design

Paper ID : 41

An Innovative Graphical Design of Two-Circular Groove and Forming Wheels

Wei-Fang Chen* and Ya-Lin Shen
49 Zhonghua Rd., Xinshih Dist., Tainan City 74448, Taiwan (R.O.C.),
Department of Mechanical Engineering, Far East University
E-mail(s): wfchen123@gmail.com

Abstract

With the rapid development of modern technology, the requirements for improving the processing quality, precision and processing efficiency of parts are becoming more and more urgent. The application of complex spiral surfaces is becoming more and more extensive. The geometric accuracy of spiral surfaces is becoming more and more demanding. The wide application of spiral surfaces in engineering makes spiral surface manufacturing technology an important research topic in design and processing technology. This paper innovatively uses the differential geometry and envelope principle, combined with parameters and equation functions of CATIA, combined with parametric drawing and forming wheel design technology, to create double arc grooves and forming grinding wheels with fast, instant and high efficiency innovative design. The use of powerful graphics functions in reference variables and equations, complex mathematical operations and design simplification and efficiency. The techniques and methods of this paper not only speed up the design efficiently, but also complete the function of drawing entities. With the technology of 3D printing, the correctness of the theory and the parametric drawing can be verified.

Keywords: Envelope principle, forming wheels, 3D printing

Paper ID : 42

An Innovative Design of the Parameter Profile for Rotary Pump

Wei-Fang Chen*, Feng-Jen Lai and Zhi-Zhe Pan
49 Zhonghua Rd., Xinshih Dist., Tainan City 74448, Taiwan (R.O.C.),
Department of Mechanical Engineering, Far East University
E-mail(s): wfchen123@gmail.com

Abstract

The applications of internal-meshing rotary mechanisms use commonly compressor and pump. Internal-meshing rotary gears can sustain the high pressure and the high pressure difference, and large swept volume, easy manufacture and so on. This paper researches a new type of rotary mesh gears pump with one tooth difference. The profile of the inner rotor is the equidistant line of short frame outer cycloid and the profile of the outer rotor is multi-segment arcs. The inner rotor and outer rotor rotaries rotate around their own geometry center, small variation in torque. This paper researches the generation of the profiles and geometric relationship in pump, the basic meshing properties of gears, the radius of the pitch circles, the position of the instantaneous center and the valid meshing range of the tooth head arc and so on. One tooth difference of rotary pump profile has four parameters of eccentric distance, number of teeth of the inner rotor outer gear, position radius of the center of the outer rotor root circle and radius of the outer rotor root circle. This article uses these four parameters to establish the contour of one tooth difference of rotary pump, and uses the CATIA parameter and equation drawing function to complete the high-speed and immediate design of the one tooth difference of rotary pump.

Keywords: Internal gear pump, one tooth difference, mesh, equidistant curve

Paper ID : 43

A New Process Model for Technology Forecasting

Kang Wang[1], Runhua Tan[1], Wendan Yang[1], Jianguang Sun[1], Mengyu Chen[2]
[1]School of Mechanical Engineering, Hebei University of Technology, Tianjin, China
[2]Business School, Nankai University, Tianjin, China
E-mail(s): showwk@163.com

Abstract

Innovative design is the key to improve the market competitiveness of developing countries and emerging economies. The uncertainty of future development is a difficult problem in the design process. Therefore, technology forecasting is introduced as a means of aided design. In this paper, a new process model of technology forecasting is proposed, which mainly includes two parts: technology necessary feature forecasting and technology development trend forecasting. The new model combines the advantages of qualitative methods and quantitative tools, and has a certain reference value for the actual production of relevant enterprises.

Keywords: Technology Forecasting, User Need, Patent Analysis, Cutting Machine

Paper ID : 44

Mass-Engineer-Invention Driving Innovation：A Pattern Of Technology Transfer For Low Cost Innovation In Industries In China

Runhua Tan, Junlei Zhang, Xiangdong Li, Qian Xin
National Engineering Research Center for Technological Innovation Method and Tool
Hebei University of Technology, Tianjin, China
E-mail(s): rhtan@hebut.edu.cn

Abstract

How to increase the impact of TRIZ transfer to industries is a difficult situation in the TRIZ community in the world today. After TRIZ is introduced into China the same situation is faced in industries. This paper firstly identifies the obstacles of TRIZ transfer processes and then introduces C-TRIZ that is further development of TRIZ in China. MEIM which is a mass-engineer oriented training model is then constructed to support the transfer of C-TRIZ/TRIZ. Some outputs of transfer classes are demonstrated under the interacted environment of local governments, intermediary agencies, university and companies. The study shows that a new pattern for innovation, mass-engineer-invention driving innovation, is formed, which is a low cost and suitable for the C-TRIZ/TRIZ transfer to the industries in China.

Keywords: TRIZ, C-TRIZ, technology transfer, innovative engineers, low cost innovation

Paper ID : 45

Exploring and Evaluating Pressure Measurement Methods for Food Extrusion in Cake Decoration with Systematic Innovation Method

Jo-Peng Tsai[1]*, Yu-Gang Chen[2] and Min-Fa Chiu[1]
[1]Department of Food and Beverage Management, Far East University, Taiwan
[2]Department of Innovative Design & Entrepreneurship Management, Far East University, Taiwan
E-mail(s): perng@cc.feu.edu.tw

Abstract

The processes in the cake decoration include many steps such as plastering, sauce dripping, flower extrusion and other decorations. In the above-mentioned steps, the flower extrusion is the most difficult and value-added process as it needs individual aesthetic literacy and long-term skillful training. The flower extrusion technique in cake decoration requires a lot of time, experience and technical accumulation to afford the competence. In present, there exists a talent fault in cake industry. The core techniques in the flower extrusion process are pressure control and motion control. In this paper, we explored the stress control problem so the pressure measurement is a key issue. Therefore, a systematic innovation method was adopted to explore and evaluate the pressure measurement methods on the extrusion process of the cake decoration. Functional analysis tool was used to analyze the technical problems. Then, the scientific effect knowledge base tool was adopted to find the feasible methods to solve the pressure measurement problem. Finally, we adopted Pugh's matrix tool to evaluate the solutions based on some metrics. The contribution of this paper is to proposed and demonstrated a systematic innovation method to solve the practical problem in the food and beverage industry.

Keywords: Flower Extrusion, Function Analysis, Scientific Effects Database, Pugh's Matrix.

Paper ID : 46

From optimization till contradictions resolution related to the process of machining composite materials

Hicham Chibane, Sébastien Dubois, Roland De Guio
CSIP, ICube Laboratory, INSA de Strasbourg, Strasbourg, France
E-mail(s): hicham.chibane@insa-strasbourg.fr

Abstract

Maximizing productivity in machining is a today real challenge, as products have to be proposed faster and faster on the market. However in a competitive environment, this increasing of productivity cannot be performed at the expense of quality. Thus to find the best compromise, Design of Experiments are used to propose to best relevant process in regard of the required specs. But here also a limitation remains: the cost of the experiments, thus several proposals exist to limit the number of experiments.

In this article, the authors will propose a global approach to find the optimal solution out of Design of Experiments and to increase this optimum by the complementary use of TRIZ-based methods. For this the Pareto frontier will be built, out of the Design of Experiments results, Generalized Systems of Contradictions will be formulated, and then concepts of solution will be proposed.

This proposal is an illustration of a global research project aiming at proposing a continuum and cross-fertilization between optimization and inventive methods.

Keywords: Design of Experiments, Generalized System of Contradictions, Machining of Composite Materials, Optimization and Invention Continuum.

Paper ID : 47

Design Development for Pressure Vessel Product Using Fuzzy QFD, DEA and TRIZ

Mei-Hwa Chen, Hsin Rau*, Po-Tsang Huang
Department of Industrial and Systems Engineering, Chung Yuan Christian University,
Taoyuan City, Taiwan 32023, R.O.C.
E-mail(s): h641999@gmail.tw; *hsinrau@cycu.edu.tw

Abstract

Pressure vessels are widely used in various industries such as petrochemical, steel, dyeing and automobile. There are about 30,000 metal pressure vessels in Taiwan. Due to long-term storage with metal, the welded part is prone to cracking, damaging, etc., Poor structure or long-term storage reduces reliability which may lead to cracks and explosions. Negligence on periodic checking of potential hazards may result in accidents such as gas leak that endangers the operator as well as the surrounding environment. This study develops a design methodology, which is based on TRIZ, Fuzzy QFD, and DEA to address the reliability shortfall and safety issues. The resulting design does not only innovate pressure vessel products but also provide a design reference which promotes safety on pressure vessels from the known harsh environment.

Keywords: Fuzzy QFD, DEA,TRIZ, Pressure vessel

Paper ID : 48

Use TRIZ to design a multifunctional flashlight

Shan Yang Wang [1]*, Chia-Nian Shyi[2]
[1]*Department of Computer Science and Information Engineering, Far East University, R.O.C.
[2]Department of Computer Science and Information Engineering, Southern Taiwan University, R.O.C.
E-mail(s): mango@mail.feu.edu.tw [1]*; shyi@mail.stust.edu.tw[2]

Abstract

Flashlights are necessities in our daily life. When power failure happens, we need a flashlight to help us move. But if a flashlight can only give one function, it becomes less useful when disaster comes, like earthquake. To make a flashlight more useful, we use TRIZ method to design a multifunctional flashlight that can be useful when earthquake happens. This flashlight can be automatically powered on when it tilts and guides user to find it in a dark space. This flashlight can also make beeps if user can not move and need help. Designed with TRIZ method, this flashlight is useful when user faces emergent situations and can save people's life.

Keywords: flashlight, TRIZ, 40 principles, earthquake

Paper ID : 49

A Methodology to identify noise that causes tinnitus

Shan Yang Wang[1]* , Chia-Nian Shyi[2]
[1]*Department of Computer Science and Information Engineering, Far East University, R.O.C.
[2] Department of Computer Science and Information Engineering, Southern Taiwan University, R.O.C.
E-mail(s): mango@mail.feu.edu.tw [1]*; shyi@mail.stust.edu.tw[2]

Abstract

Many people are suffering from tinnitus. Tinnitus is a symptom that people always hear unpleasant sounds and can not get rid of it. The reasons leading to tinnitus are still unknown. Traditional Chinese medicine and Western medic give different explanations to tinnitus. Tinnitus nearly can not be cured. We accidentally find that some sounds of tinnitus come from environment noises. And, we begin to verify the assumptions by trying to detect these tiny noises. Systematic innovation and TRIZ's training help us find the way to detect tiny noises. In this paper, we proposed methods to detect tiny sounds and tiny vibrations that cause tinnitus. By identifying the sounds and vibrations, Tinnitus people can escape noising sceneries or make their environment more comfortable. By being aware that they can hear tiny sounds, tinnitus people can deal with tinnitus with a positive attitude and feel less anxious and have a better life-quality.

Keywords: fight-or-flight , tinnitus, TRIZ, vibrations.

Paper ID : 50

Design of Steel Cut Planning System Base on TRIZ

Shan Yang Wang [1]*, Chia-Nian Shyi[2]
[1]*Department of Computer Science and Information Engineering, Far East University, R.O.C.
[2] Department of Computer Science and Information Engineering, Southern Taiwan University, R.O.C.
E-mail(s): mango@mail.feu.edu.tw[1]*; shyi@mail.stust.edu.tw[2]

Abstract

In the steel industrial, material cost is responsible for most cost. How to lower the cost of the steel material is the most important. Before buying steel strips, user must be careful to estimate their cost. The best way is to decide cut planning before buying it. So, steel industrial must rely on cut planning software. But, many construction plant approach cut planning by manual calculation which leads to error and waste money. Because manual calculation takes too much time, and can not find optimal solution. In this paper, we present a cut planning system that can obtain near optimal solution, so that user can lower the cost as possible as he can. And, by using 40 inventive principles, the cut planning algorithm eliminate many unnecessary calculations, so this system runs very fast. To overcome the scalability, we introduce Simulated annealing method and make the system more practical. The business model is deployed on cloud, so that we can adjust its size dynamically.

Keywords: steel, cutting plan, TRIZ, 40 inventive principles.

Paper ID : 51

Use TRIZ to develop a device that can ease scalp

Shan Yang Wang[1]* , Shwi Chun Wang [2]
.[1*]Department of Computer Science and Information Engineering, Far East University, R.O.C
.[2] Department of Health-Business Administration, Fooyin University, R.O.C
E-mail(s): mango@mail.feu.edu.tw[1*], sc085@fy.edu.tw[2]

Abstract

Many people are suffering from tinnitus. Tinnitus is a symptom that people always hear unpleasant sounds and can not get rid of it. The reason and mechanism that causes tinnitus is still unknown. Traditional Chinese medicine and Western medic give different explanations to tinnitus. Even so, we find tinnitus is closely related to mental pressure. Since, some people with tinnitus can hear tiny sound and shows anxious symptoms. Previous study shows by harmonizing your craniosacral system is good for people to easy his muscles. But it takes a long time and spend a lot of money. So, we develop a device which can ease people's scalp and to alleviate tinnitus.

Keywords: vibrations, TRIZ, 40 principles, tinnitus

Paper ID : 52

Design of Steel structure processing system

Shan Yang Wang[1*] , Shwi Chun Wang[2]
[1*]Department of Computer Science and Information Engineering, Far East University, R.O.C.
[2]Department of Health-Business Administration, Fooyin University, R.O.C.
E-mail(s): mango@mail.feu.edu.tw [1*], sc085@fy.edu.tw[2]

Abstract

In the steel industrial, steel structure processing report system is very important. Since, the system can help control the process of a project. To design this system needs experience and high skillful programing skills. In this paper, we present our steel structure processing report system. This system help boss control the progress of a project. During the designing period, we consider 40 inventive principles to improve the quality the system and use object-oriented program skills to develop it. We try our best to avoid users keying wrong data. The system also provides many reports so that users can have the best experience. Neat user interface help user understand the system easily, even he is not an experienced hand. Many future function can be easily stacked on the system.

Keywords: steel structure processing, TRIZ, 40 inventive principles.

Paper ID : 53

Integrate animal instinct to Substance-Field Analysis

Shan Yang Wang[1*] , Shwi Chun Wang [2]
[1*]Department of Computer Science and Information Engineering, Far East University, R.O.C.
[2]Department of Health-Business Administration, Fooyin University, R.O.C.
E-mail(s): mango@mail.feu.edu.tw[1*], sc085@fy.edu.tw[2]

Abstract

Substance-Field analysis is a powerful tool in TRIZ. It can make solution more inventive than practical. But, applications of Substance-Field analysis are mostly belong to engineer solutions. The definitions of field are limited in physical field, like mechanical, acoustic, thermal, chemical, electric and magnetic fields. In our research, we find animal instinct can also be seen as a field. Take mouse for example, food and mouse are 2 substances and the eating (animal instinct) can be seen as field. And these 3 thing can constitute a Substance and Field. Nests and birds and living (animal instinct) can be seen as Substance and Field. By introduce animal instinct to Substance Field Analysis. We can use the operations of Substance Field Analysis to approach biology solutions.

Keywords: biology, SF analysis, TRIZ, 40 inventive principles.

Paper ID : 54

Integrating Systematic Innovation Method and Fuzzy Markup Language on the Application of the Pastry Tips Selection

Jo-Peng Tsai[1*], Li-Wei Chen[2], Song-Bao Yang[2]
[1]Department of Food and Beverage Management, Far East University, Tainan, Taiwan
[2]Department of Software Engineering and Management,
National Kaohsiung Normal University, Kaohsiung, Taiwan
E-mail(s): perng@cc.feu.edu.tw*

Abstract

The flower extrusion is the most difficult and value-added process in the cake decoration. The process needs not only individual aesthetic literacy but also long-term skillful training. For those who are inexperienced, the first problem in the flower extrusion is how to select the suitable pastry tips before the piping process implemented. Therefore, in this paper, we integrated the systematic innovation method and fuzzy markup language (FML) on the application of the pastry tips selection. First, we defined the situation of the problem, and analyzed the problem with the functional analysis tool. Then we established the FML rules of pastry tips selection based on the flowers' features. The contribution of this paper is to propose and establish a method to help inexperienced people select the suitable pastry tips. Moreover, it can be further developed to form a teaching and training system.

Keywords: Systematic Innovation Method, Fuzzy Markup Language, Pastry Tips, Knowledge Base.

Paper ID : 55

Applying Systematic Innovation Method on the Design of Cooler Bag for Free Gift with Purchase of Product Marketing

Jo-Peng Tsai*, Chia-Ying Lin
Department of Food and Beverage Management, Far East University, Taiwan
E-mail(s): perng@cc.feu.edu.tw

Abstract

At present, the activity of free gift with purchase has become an important means in the product marketing. However, in present, most the styles or functions of the cooler bags in free gift with purchase activities are the same. This free gift lacking special or different features is difficult to attract customers. Therefore, in this paper, we redesign the cooler bags with systematic innovation method. Firstly, the main parameters of value (MPV) tool was adopted to analyze the customers' values for the current cooler bag. So the attributes of the products that the customer needs but not satisfied can be found. Then based on these attributes, the deficient functions of the product were analyzed with function analysis tool. Finally, the scientific effect knowledge base tool was used to solve the problem so as to generate some valuable design. This paper will provide a research method reference for the design of free gifts with purchase in product marketing.

Keywords: Cooler Bags, Main Parameters of Value (MPV), Function Analysis, Scientific Effect Knowledge Base.

Paper ID : 56

Innovation and Added-Value of Extruded Material in Cake Decoration with MPV and Trend Analysis

Jo-Peng Tsai*, Ching-Jun Huang
Department of Food and Beverage Management, Far East University, Taiwan
E-mail(s): perng@cc.feu.edu.tw

Abstract

The flower extrusion is the most important and valuable process in the cake decoration. In the process, the extruded materials for the cake decoration are mostly made of hydrogenated oils as they are not susceptible to temperature. However, the hydrogenated oil has a negative influence on health. Although some people have changed the extruded material into bean paste, there still exists a problem of excessive calories and too high sweetness. Therefore, in this paper, we proposed a method to innovate and add the value of extruded material in cake decoration. Firstly, we used the main parameters of value (MPV) analysis to explore the factors that customers care but feel unsatisfied for the extruded materials in cake decoration. Then we adopted the functional analysis (FA) tool to understand the negative functions of the current extruded materials in cake decoration for the human body. Finally, the trend analysis was used to propose improvement suggestions. The method along with examples in this paper can provide a reference for innovation and added-value of product in the food and beverage industry.

Keywords: Main Parameters of Value, Function Analysis, Trend Analysis, Cake Decoration.

Paper ID : 57

Development of a Portable Seating Assist Device

Yu-Gang Chen[1], Jo-Peng Tsai[2]
[1]Dept. of Innovative Design and Entrepreneurship Management, Far East University, Taiwan
[2]Dept. of Food and Beverage Management, Far East University, Taiwan
E-mail(s): [1]ygchen1@gmail.com; [2]perng@mail.feu.edu.tw

Abstract

In addition to a variety of major diseases, the most common problem that plagues the health of the elderly is that they are difficult to sit and get up from chairs, sofas and toilets, etc. because the knees are aging or unhealthy. Although there are many products on the market that can help the user to gradually tilt from the original seat to help get up from the chair. However, due to the lifting mechanism is built into the seat, the entire set of seats is complex and expensive, and cannot help most people who need assistance.

This research develops a portable seating assist device by systematic innovative method. It is designed to be portable and can be applied on one chair to the others. A combination of a labor-saving mechanism and some sets of compression springs are designed to achieve the goal of helping the elderly standing up much easier with less cost.

Keywords: portable, seating assist, device, elderly.

Paper ID : 59

Systematizing Application Range of Visual Management by Advanced Digital Technologies

Koichi Murata
Nihon University, Japan
E-mail(s): murata.kouichi30@nihon-u.ac.jp

Abstract

This paper studies for theorizing visual management, a technology for lean management. In Stefik's principles and strategies of radical innovation, the patterns of invention are classified into four types: theory-driven, data-driven, method-driven, and needs-driven. The Fourth Industrial Revolution, which is actively discussed in the industry in recent years, involves an innovation with various advanced digital technologies, and it can be considered to be a method-driven invention in the above classification. In this invention, it is generally important to think what purpose the provided method is to be used. However, in the early stages of the installation of digital technology, it is largely based on someone's ideas and hard to say systematic innovation. Based on this problem recognition, in order to contribute to the diffusion period in the future, this paper proposes scenarios for extending the visual management by advanced digital technologies, and describes some perspectives for applying expanded visual management. The above discussion serves as a guideline for the challenge of digitizing visual management in the industry. It will also lead to academic achievements such as the systematization of application areas of visual management through emerging advanced digital technology.

Keywords: Digitalization, Operation Management, Systematic Innovation, Visual Management.

Paper ID : 60

Prioritized Effect Identification for Problem Solving Based on Fuzzy Identification

Jealousy Hong[1]; D. Daniel Sheu[2]; MC Chiu[3]
[1]Phoenix Silicon International Corporation
[23]Department of Industrial Engineering and Engineering Management, National Tsing Hua University
E-mail(s): hong.jealousy@gmail.com[1]; dsheu@ie.nthu.edu.tw[2]; mcchiu@ie.nthu.edu.tw[3]

Abstract

This research proposed a Fuzzy quantitative method to identify TRIZ effect solution models based on the idea of similar problems having similar solutions. A total of 210 known cases and 70 effects were from scientific website/knowledge database. By conducting a 3-fold verification of 210 cases, the ten highest similarity solutions provided a hit rate exceeding 96.2% coverage of original solutions. This substantially exceeded the 13.3% hit rate of ten randomly selected solutions. The ten worst similarity solution only provided 0% hit rate. Sensitivity analysis showed that the top three identified solutions can have 90% hit rate indicating the effective of the priority selection.

The contributions of this study include: 1)Allowing the users quickly, objectively, and repeatably obtaining solution to a problem with priority based on existing effects and solved problems with Fuzzy similarity. 2) Using multivariate similarity analysis to enhance original simple similarity measures to reflect real-world situation and producing better performance than crisp similarity.

Keywords: Theory of inventive problem solving (TRIZ), Systematic Innovation, Multivariate similarity, Fuzzy similarity, Effect Knowledge Database.

Paper ID : 61

An Innovative Improvement Case Study for Traffic Regulation Activity of Military Camp Opening to the Public

Youn-Jan Lin[1]*, Jo-Peng Tsai[2], Jyhjeng Deng[3], Lin-Wei Kao[1], Cheng-Tai Chuang [1]
[1]Institute of Management, Minghsin University of Science and Technology, Taiwan
[2]Department of Food and Beverage Management, Far East University, Taiwan
[3]Industrial Engineering and Management Department, DaYeh University, Taiwan
E-mail(s): yjlin@must.edu.tw

Abstract

The Ministry of National Defense held activities of "Military Camp Opening to the Public" regularly located at Army, Naval or Air Force bases, not only exhibiting the Armed Forces training and combat readiness preparation, but also making civilians get closer and more understood, in order to convergence consensus of all-out-defense. However, it usually costs lots of manpower to conduct traffic control while holding those large scale activities, even makes traffic jamming around the military base, because people felt resentful and lower the effectiveness. As a result, improving the activity of traffic control during military camp opening to the public is the specific aim in this study.

The authors used the operation of the troops as the research background to explore the activity of traffic control in the inner and outer gates of the camp, and employed the experience of participating in the service as the references for problem situation specification, and then applied the contradiction matrix, 40 invention principles in TRIZ for Business and Management, to improve of the traffic operation control activity currently. The author generate some innovative ways as reference architecture for organizing activities in future.

Keywords: Traffic Control Activity, TRIZ for Business and Management, Contradiction Matrix, Invention Principles

Paper ID : 63

Testing the impact of Systematic Innovation training in the NHS.

John Sainsbury[1], Pauline Found[2] , John Bicheno[2], Darrell Mann[2]
[1]Greater Manchester Mental Health NHS Foundation Trust1
[2]University of Buckingham
E-mail(s): john.sainsbury@gmmh.nhs.uk, pfound@me.com, bichenojohn@me.com, darrell.mann@systematic-innovation.com

Abstract

The study was inspired by the twofold challenge, posed by Birdi, Leach and Magadley (2012), to determine whether TRIZ training is as effective for managers faced with management problems, as it is for engineers faced with engineering problems, and whether having a control group of non-trained participants strengthens the study design. An experiment was designed to consider the following null hypothesis: 'training NHS Employees in Systematic Innovation has no more effect on problem-solving abilities and perception of a domain specific problem, than business as usual'.

The impact of Systematic Innovation training was tested through the method of a randomised control, feasibility, trial. Participants completed measures at two phases on problem perception and innovative skills.

Participation included one group per study arm. Pansensic, a semantic analytical software tool mined for: i) sentiment, and ii) problem-solving language, cross-referenced with Myers Briggs profiles, to provide insight into participants during the two phases of the study. Due to low participant numbers the null hypothesis was neither accepted nor rejected.

In comparison to the work of Birdi, Leach and Magadley (2012), which explored the impact of TRIZ on over 100 engineers, who were followed up for up to three years, through multi-method approaches, the current study differs in numbers, researcher proximity to participants and length of longitudinal follow up . In addition, the study was limited in the breadth of sectors and countries involved.

The study's contribution is the utilisation of randomised control research methods, familiar to the NHS, for business purposes. Qualitative analysis of participants' problem perception, emerging from Pansensic, is of special interest, in that it draws on various lenses to reveal respondents' intended meaning. Despite inconclusive outcomes, the paper is valuable in showing the feasibility of such a study in health management, with the potential to widen the scope in future studies.

Keywords Systematic Innovation, health management, semantic analysis, RCT.

Paper ID : 65

A Strategic Innovation Model of Innovation

Paul Frobisher (B.Eng MPhil)
Strategic Innovation Ltd
E-mail(s): p.frobisher@strategic-innovation.co.uk

Abstract

The academic literature provides many models of the innovation process, often based on the 'innovation funnel'. Experience from earlier research has shown that these models struggle to explicitly define innovation as a process at the strategic level, or provide ways to measure innovation effectiveness. (Frobisher, 2010). To address this gap, a strategic model of innovation was developed based on the IDEF0 methodology. Modelling innovation as a hierarchical, standardised process, conforming to the strict discipline of IDEF0 resulted in an improved understanding of the innovation process and enabled more robust measurement of the company wide impact of innovation support activities, in this research case measuring the benefits of adopting TRIZ tools.

Since the original work, this strategic model of innovation has been applied to diverse fields including FMCG, Automotive, Chemicals City Planning and Sustainability. Learning from these experiences has informed refinements to the model such that it now provides a coherent, top-level understanding of innovation as a strategic process.

The key takeaway is that innovation is more than the introduction of new products and services, it is more closely aligned to business strategy. It enables an understanding of the importance of intangibles especially in the outputs of the innovation process. It also addresses the contradictions inherent in embedding sustainability within business and in society more widely. This paper describes the model and its practical application in framing Systematic Innovation programmes including TRIZ and TrenDNA. An example is provided, asking the strategic question - is the world really transitioning to electric vehicles, and if so, when?

https://purehost.bath.ac.uk/ws/portalfiles/portal/187941283/UnivBath_MPhil_2010_P_Frobisher.pdf

Keywords: Business Strategy, Electric Vehicles, IDEF0, Innovation Model, Sustainability, TRIZ

Paper ID : 66

TRIZ Learning from Teaching

Paul Frobisher (B.Eng MPhil)
Strategic Innovation Ltd
E-mail(s): p.frobisher@strategic-innovation.co.uk

Abstract

The author has been teaching TRIZ at the University of Bath over the past six years, with students from a variety of backgrounds and disciplines, and over 30 nationalities. The students have been asked to write reflective journals about their learning within this course about what they have learnt during TRIZ lectures, tutorials and group work. These personal reflections have provided valuable feedback that has helped to identify topics and tools that students find difficult to understand and has led to changes in the teaching content delivery to address these. Lessons learned from this experience are thought to be worth sharing with the wider SI community.

Although the ideality equation is essentially a simple concept, students have often been confused by the terminology. Despite the course lectures addressing this, and stressing the purpose and careful definition of the terms, the evidence from the reflective journals suggests that the confusion persists, in part due to the variety of terminology used in other sources of information about the ideality equation that is available on the Internet. The paper explains the misunderstandings and proposes a solution for the TRIZ community to consider.

The 9 Windows tool is also a key pillar of TRIZ which many find trivial to learn and simple to use. Nevertheless, a significant number of students have difficulty in understanding and applying the tool - given the exact same teaching material and methods. A proposed solution is to suggest two modes of applying the 9 Windows. One being a process mapping mode, and the other a historical mode.

The findings and recommendations help to improve the understanding, teaching and use of two fundamentally important TRIZ tools.

Keywords: 9 Windows, Ideality, Teaching, Terminology

Paper ID : 67

Innovation and Feasibility Evaluation of Healthy Beverage with Local Agricultural Product based on Morphological Matrix Method

Jo-Peng Tsai[1]*, Jyhjeng Deng[2], Youn-Jan Lin[3]
[1]Department of Food and Beverage Management, Far East University, Taiwan
[2]Industrial Engineering and Management Department, DaYeh University, Taiwan
[3]Institute of Management, Minghsin University of Science and Technology, Taiwan
E-mail(s): perng@cc.feu.edu.tw*

Abstract

In this paper, the morphological matrix method was used to explore the possible combinations of healthy beverage with local agricultural products. The feasibility of each type of healthy beverage was evaluated by cross-consistent assessment (CCA). Then we eliminated the conflict combination of tastes or attribute in the CCA process. After screening, we reserved six combination types of healthy beverage – (1) the longan-fungus-black sugar, (2) longan-fungus-honey, (3) longan-lotus root-black sugar, (4) water chestnut-fungus-black sugar, (5) longan-lotus root-honey, and (6) water chestnut-lotus root-black sugar. Then we put the above six combinations to conduct a market feasibility evaluation. Based on the above ranking process, we can provide the healthy beverage with higher successful possibility and more flavors choices for the consumers caring health.

Keywords: Morphological matrix, Cross-Consistent Assessment, Local Agricultural Products, Healthy Beverage.

Paper ID : 68

Development of Online Collaboration Tools (OCT) for Collaborative Innovation Design

Zhao Yu[1], Zhinan Zhan[2]
[1] School of Design, Shanghai Jiao Tong University
[2] School of Mechanical Engineering, Shanghai Jiao Tong University
E-mail(s): zhaoyu3398@163.com[1]; zhinanz@sjtu.edu.cn[2]

Abstract

With the development of information technology and systematic innovation theory, the innovative design of products and service is no longer confined to individuals or one team. There are more and more cross-regional and multi-disciplinary collaborative design integrate the time, human and other resources to promote more innovation activities. However, there is still a lack of systematic and effective tools to cover the whole process of collaborative design activities. To address this gap, we provide a case example to solve this problem of using online collaboration tools (OCT) in collaborative design context, and further illustrate some implications through the systematic innovation perspective. In the present paper, we discuss how the adoption of online collaboration tools has influenced the collaborative design activities based on the IDEEA drone design workshop. Discuss the impact of online collaboration tools on the participants ' learning and collaboration effect in the distributed systems. Online collaboration tools can be used to access knowledge that originates from external as well as internal sources, but it seems that online tools increase the visibility and accessibility of internal expertise and therefore the use of internal knowledge. The main contributions of this paper include:1) Our research revealed that the online collaboration tools can promote innovative design of multi-disciplinary and innovation design. The design tasks of the workshop are completed by each team with almost no traditional offline collaboration. 2) The implementation of collaborative design is divided into five types according to the design thinking process: empathize, define, ideate, prototype and test. Analyzing the attributes of different collaboration tools in the process of innovative design. 3) Discuss from the project what kind of technical methods and tools are suitable for the specific collaborative design system. Provide guidance for future collaborative design activities.

Keywords: Collaborative Design; Systematic Innovation; Computer-aided problem solving; Online Collaborative Tools.

Paper ID : 69

Analyzing Environmental Continuous Improvement (e-CI) in Japanese Manufacturing Industry by Data Envelopment Analysis

Rena Ohara, Koichi Murata
Nihon University, Japan
E-mail(s): cire16037@g.nihon-u.ac.jp

Abstract

Owing to realize sustainable manufacturing industry, the design and operation of an environment-friendly supply chain is recently one of the important management issues. As efforts to be recognized as reliable enterprise from a society including stakeholders, many organizations are conducting continuous improvement (CI) activities in a daily operation, which contributes to the steady improvement of existing supply chain from the viewpoint of environmental performance. In addition, they open the report of this activities for their corporate social responsibility. This research design the evaluation framework of environmental continuous improvement (e-CI), and develops systematic procedure for measuring, analyzing, and classifying such efforts quoted by Data Envelopment Analysis (DEA). This paper also compares e-CI activities in both 2014 and 2018 years in Japanese manufacturing industry using the proposed model.

Keywords: Supply Chain Management, Kaizen, Sustainability, Data Envelopment Analysis (DEA).

Paper ID : 70

A Fundamental Study on Evaluation of Work Sharing Plan by Analytic Hierarchy Process

Shigemasa Kasahara, Koichi Murata
Nihon University, Japan
E-mail(s): shigemasa6116@gmail.com

Abstract

The creation of a high productive workplace is a common difficult issue in an organization around the world. In particular, this should be urgently resolved in an aging society with a declining birthrate. Work sharing is one of the industrial engineering approaches to effectively activate human resources. In this methodologies, choosing a partner is an important factor for improving work performance. However, many of the approaches are based on empirical things, and trial and error are repeated. This research proposes three kinds of models to think appropriate pairs for a work with Analytic Hierarchy Process (AHP), which is a typical method of decision making problem. And then, this paper discusses a systematic work sharing with numerical simulations for a pair selection of doubles in tennis as a case of work sharing problem, using proposed models.

Keywords: Work Sharing, Productivity, Analytic Hierarchy Process (AHP), Human Resource Management.

Paper ID : 71

A Study on Systematic Design of Key Performance Indicators in the Era of Internet of Things

Takahiro Tamura, Koichi Murata
Nihon University, Japan
E-mail(s): ttamu418@gmail.com

Abstract

In the era of Internet of Things (IoT), the possibility of measuring, analyzing, and improving various activities in a production system has been expanding by the rapid spread of physical sensors, large-scale database and wide-area communication networks. In order to obtain this perfect opportunity, it is necessary to consider the two problems of what kind of information is acquired from a production system network, and how to utilize the obtained information for management problems such as performance management, cost reduction and customer satisfaction improvement. This research aims to develop a platform that systematically design key performance indicators (KPIs) to effectively approach to the two problems. This paper also reports the development results of KPIs with the collaborative company by the proposed platform.

Keywords: Performance Management, Intent of Things (IoT), Key Performance Indicators (KPIs).

Paper ID : 72

Two Aspects of Function for Technical Systems

Yong Won Song
Department of Nano-Optical engineering, Korea Polytechnic University
E-mail(s): ywsong82@gmail.com

Abstract

Function is very important concept to understand technical systems. It is defined as 'specification of an action performed by a material object (Function Carrier) that results in a change or preservation of a value of an attribute of another material object (Object of the Function)'. (MATRIZ, International Association of TRIZ). This is 'action' oriented definition. But we need to see the result or outcome of the action to understand the technical system and define the core problem.

In this paper author proposes two aspects of function definition to understand technical systems and define the problem with various perspectives. One is 'action' oriented definition and the other is 'result' oriented one. This paper shows how these 2 definitions help people to solve problems effectively and creatively.

Keywords: Function Carrier, Object of the function, Action oriented Function, Result oriented Function, Core problem.

Paper ID : 73

The Impact of Flexible Retrievals on Import Container Relocation at Container Terminals

Yuanjun Feng[1], Dongping Song[1], Dong Li1, Qingcheng Zeng[2]
[1]University of Liverpool, [2]Dalian Maritime University
E-mail(s): Yuanjun.Feng@liverpool.ac.uk, Dongping.Song@liverpool.ac.uk, Dongli@liverpool.ac.uk, qzeng@dlmu.edu.cn

Abstract

Retrieving containers from the yard of port terminals often requires unproductive relocation moves, which are costly for terminal operators and can cause delays to onward transport. Reducing the number of relocations has been the major concern of terminal operators. The retrieval of import containers is related to the arrival time of external trucks and therefore, subject to high uncertainty and variability, which complicates the relocation problem. In terminals with a truck appointment system, the arrival time windows of external trucks can be obtained from the truck appointment information in advance, but the exact arrival time within the appointed time window is still uncertain. In the practice of a typical terminal, import containers are retrieved on a first-come-first-serve basis according to the truck arrival sequence. This service policy may lead to sub-optimal solution from the overall system efficiency perspective and is not able to hedge against the system uncertainty. This paper introduces a new class of service policy that allows a certain degree of flexibility in the handling sequence of the trucks booked in the same time window. This flexible service policy can decrease the level of truck arrivals uncertainties and yield more opportunities for optimization on the number of relocation. To describe the randomness for truck arrivals, a more general probabilistic model that considers trucks' arrival preference is presented. The problem is formulated by a stochastic dynamic programming model with the objective of minimizing the expected number of relocations to retrieve all containers in a given stacking bay and is solved by a search-based algorithm in a tree space to optimality. Extensive computational experiments results demonstrate that the proposed flexible service policy can significantly reduce the number of relocations.

Keywords: flexible retrievals, import container relocation, stochastic dynamic programming, truck appointment information.

Paper ID : 74

An Analysis of Port Competition from Hinterland Transport Chain Perspective

Jiajia He[1], Dongping Song[2], Andrew Lyons[3]
Operations and Supply Chain Management, University of Liverpool, L69 3BX, United Kingdom
E-mail(s): Jiajia.He@liverpool.ac.uk[1], Dongping.Song@liverpool.ac.uk[2], A.C.Lyons@liverpool.ac.uk[3]

Abstract

This paper studies the price decisions of two ports competing for shippers located in a two-dimension hinterland. Shippers choose port based on the performance of hinterland transport chain including port price, transportation cost, congestion, and emission. There has been no research yet models the competition between ports considering both congestion and emissions with two-dimensionally distributed shippers. We make the main contributions as follows: (i) analysing port competition problem involving economic aspect, environmental aspect and congestion by taking the hinterland transport chain's perspective; (ii) applying a two-dimensional Hotelling model for a two ports competition system with shippers uniformly distributed in an overlapping hinterland region, and solving the coupling problem between port demand and the port related congestion & emission level; (iii) applying Nash game and Stackelberg game to model simultaneous and sequential decision making behaviours of two competing ports respectively and providing relevant algorithms to solve these two game models in numerical experiments; (iv) a case study of Shanghai and Ningbo-Zhoushan is used to illustrate the models and results. For the game solution algorithm, an iterative algorithm is proposed to solve the port choice model. Epsilon-approximate equilibrium solutions are obtained for the game models.

Keywords: Congestion and Emission, Game theory, Hotelling model, Port competition.

Paper ID : 76

A new way to classify physical effects based on Wikipedia

Dr. Pei.ZHANG[1], Prof. Denis CAVALLUCCI[2], Prof. Cecilia ZANNI-MERK[3]
E-mail(s): pei.zhang@insa-strasbourg.fr[1], denis.cavallucci@insa-strabsbourg.fr[2], ceililia.zanni-merk@insa-rouen.fr[3]

Abstract

Great inventions are often triggered by natural phenomenon that is previously unseen in the engineering domain. As one of the most important knowledge sources of TRIZ, the use of physical effects often give rise to inventive and reliable designs. To enable the users of TRIZ to access them in a rapid and easy manner, the physical effects are classified in different categories, and expressed as functions. However, the existing classifications of the scientific effects have two drawbacks: on the one hand, the eligible categories are too many, hence it is very difficult for the user to choose one among them. On the other hand, the use of the eligible classifications do not support the direct use of the collection of scientific effect. As a result, the use of this collection of knowledge requires experiences and skills both in engineering and physical domain, making it cumbersome or very difficult for the users to retrieve the effects they need based on the eligible categories. Therefore, the collection of physical effects needs to be classified differently, in a way that enables a direct access to the relavant ones. In this paper, we proposed a new approach to classify physical effects based on Wikipedia. The proposed approach is composed of three steps: data collection, feature selection and classification. In addition, the proposed method is applied to design a new mascara. The proposed approach presents the possibility to simplify the usage of physical effects in inventive design.

Keywords: Machine learning, Physical effects, TRIZ, Wikipedi

Paper ID : 77

The State of New Product Introduction Delays: A Systematic Literature Review and Guidance for Future Research

Matt Mitchell
University of Liverpool
E-mail(s): matt.mitchell@liverpool.ac.uk

Abstract

Through a systematic review of 63 peer-reviewed journal articles published between 1980-2019, this work provides an integrative view of the state of the literature on new product introduction delays. The aim is to pool the existing understanding of new product introduction delays by synthesising studies in the mainstream product introduction delays literature. Specifically, in identifying the key gaps in the literature and providing future research directions, the critical view of manufacturing and supplier-specific issues in product introduction delays is intended to advance the debate on new product introduction delays in general.

Keywords: delays, new product introductions, suppliers, systematic literature review

Paper ID : 79

Linking Managerial Coaching with Innovative Work Behaviors of Employees through Affective Supervisory Commitment

Muhammad Ali[1], Basharat Raza[2], Nazish Imtiaz[3]
[1]Institute of Business Administration, University of the Punjab, Lahore, Pakistan
[2]National College of Business Administration and Economics, Lahore, Pakistan
[3]Lahore Garrison University, Lahore Pakistan
E-mail(s): mali@ibapu.edu.pk[1], basharat.hailians@gmail.com[2], nazishimtiaz@lgu.edu.pk[3]

Abstract

Managerial coaching has become a widely used managerial practice to improve various employee outcomes within organizations. However, existing literature lacks empirical evidence regarding the effectiveness of managerial coaching and less known about that how managerial coaching influences innovative work behaviors of employees through mediating effect of employees' commitment to the supervisor. The 250 surveys were sent to employees working in the software industry of Pakistan, and 207 employees responded to the survey with a response rate of approximately 83%. The structural equation modelling (SEM) analysis revealed positive and significant paths from managerial coaching to innovative work behaviors, affective supervisory commitment, and from affective supervisory commitment to innovative work behaviors of employees. Furthermore, this study is among initial researches to examine the association between managerial coaching, affective supervisory, and innovative work behaviors. This research also provides implications for managers and leaders, specifically looking to improve various employee outcomes through managerial coaching in the workplace.

Keywords: Affective supervisory commitment, innovative work behaviors, managerial coaching

Paper ID : 80

Application of TRIZ on Multifunctional integrated desk and chair

Liu Pei-Hsi *, Chen Zheng Hao, Ye Meng Wei, Liu Zi-Qi, Wu Chen-Hui, Sheng Xie-Zhi
National Chin-Yi University of Technology Department of IE&M
E-mail(s): phliu@ncut.edu.tw

Abstract

The invention provides a chair with a desktop and a chair back, it includes a seat and a chair board . The seat has a body for sitting on it, the seat plate is set in the seat body and is in an upright position or a horizontal position Transformation between flat positions. When the seat board is in the upright position, it is erected on the rear side of the seat body, and can be used as the back of the chair at this time; When the seat board is in the horizontal position, it is horizontally placed on the seat body, and can be used as a table on the chair. The position of the chair plate can be changed to achieve the function of the table top and the back of the chair.

The invention can solve the problem that the school desk and chair occupy space, the seat height cannot be adjusted, and the desktop is too small to be convenient to use. Make it easier for students to use desks and chairs.

Keywords: TRIZ, integrated, chair, transformation, telescopic

Paper ID : 81

The 7 Pillars of TRIZ^{++} Philosophies

D. Daniel Sheu[1], Dimitri Cayard[2], M.C. Chiu[3]
[1]Professor Emeritus, National Tsing Hua University, Taiwan
[2]Graduate Student, National Tsing Hua University, Taiwan
[3]Associate Professor, National Tsing Hua University, Taiwan
E-mail(s): dsheu@ie.nthu.edu.tw

Abstract

TRIZ, the theory of inventive problem solving, has been regarded as one of the most effective problem-solving tools and thinking processes for solving difficult problems. The importance of TRIZ has been acknowledged in various fields where its applications have led to great results. Most researchers focus on the practical usage of the tools or development of the tools without knowing the fundamental philosophies that make TRIZ work well. This paper presents some powerful fundamental working philosophy, known as pillars, of a greatly enhanced version of TRIZ, TRIZ^{++}. It also propose some powerful research directional opportunities of TRIZ methodology to bridge the gap between the guiding fundamental philosophies and effective practical usage.

Keywords: Enhanced TRIZ, Systematic innovation, TRIZ principles, TRIZ.

Paper ID : 82

Organizational learning capability, innovation and performance: study in small and medium-sized enterprises (SMEs)

Dr. Rizwan Qaiser Danish[1*], Shahid Hafeez[2], Hafiz Fawad Ali[3]
[1, 2]Hailey College of Commerce, University of the Punjab, Lahore.
[3]Institute of Business Administration, University of the Punjab, Lahore.

Abstract

Globalization and technological advancements have totally changed contemporary business dynamics thus, making it indispensable for business organizations to develop mechanisms that prepare their human resource to come up with innovative ideas, products and solution to enhance organisational performance. Although the direct relationship between organizational learning capability, innovative and organizational performance have mostly studied by the researchers but there is little empirical evidence about its mechanisms. This study intends to fill out the gap by empirically analysing and comparing the influence of organizational performance, innovative performance and organizational learning capability in the manufacturing and services industry of SMEs in Pakistan. The nature of study was quantitative, causal and data was collected using self-administered questionnaire from 308 middle level managers of small and medium sized enterprises of both service and manufacturing sector through cross sectional survey. The data was analysed using Structural Equation Modelling technique, SPSS and AMOS were used. The results show highly significant positive relationship between organizational performance, innovative performance and organizational learning. The Innovative performance partially mediates the relationship between organizational performance and organizational learning capability. Moreover, study found that service sector reported higher level of organizational performance in SMEs as compared to manufacturing. The limitations of the study are that its generalizability due the scope of study as it is limited to region of Lahore. The collected data is comprised of cross-sectional design therefore, analysis is made at single point of time. Future studies can evaluate contingency factors such as managerial competencies for organizational learning and performance.

Keywords: Innovative performance, Organizational performance, Organizational learning, SMEs, Services sector, Manufacturing sector

Paper ID : 83

The impact of entrepreneurship education on entrepreneurial intentions among students in Pakistan

Muhammad Ali[1], Yasir Iftikhar[2], Sarmad Ejaz[3], Rizwan Qaiser Danish[3], Hafiz Fawad Ali[4]
[1]Institute of Business Administration, University of the Punjab, Lahore, Pakistan,
[2]National College of Business Administration and Economics, Lahore, Pakistan,
[3]Hailey College of Commerce, University of the Punjab, Lahore, Pakistan,
[4]Hailey College of Banking and Finance, , University of Punjab, Lahore, Pakistan
E-mail(s): mali@ibapu.edu.pk[1], yasiriftikhar@ncbae.edu.pk[2], rqdanish@gmail.com[3], fawadali@puhcbf.edu.pk[4]

Abstract

In the last two decades, entrepreneurship education has grown significantly. The growth of entrepreneurship education points to the need for entrepreneurship to achieve a higher level of economic growth. While the number of entrepreneurship education programs are growing, and its impact is under-researched in Pakistan and studies paint an ambiguous picture of the impact of entrepreneurial education. Different theories support entrepreneurship economic influence to explain the relationship between entrepreneurship education and the entrepreneurial intentions through the theory of planned behavior, since it provides the most information on the process of intentions formation for entrepreneurship. The primary aim of this research was to explore the impact of entrepreneurial education on entrepreneurial intentions among business students in Pakistan. The 150 business students responded to survey through self-administered questionnaires. The structural equation modeling (SEM) revealed that entrepreneurship education had significant positive influence on business students' entrepreneurial intentions. In addition, this study furnishes several future directions for academic scholars and participation. The limitations have also been discussed.

Keywords: Attitude toward entrepreneurship, entrepreneurship education, entrepreneurial intentions, Perceived behavioral control.

Paper ID : 84

0n the Policy Orientation of CPEC in Pakistan: A Cynical View

Zafar Ahmad
Associate Professor, hailey College of Commerce, University of the Punjab, Lahore
E-mail(s): Zafarahmad79@gmail.com

Abstract

China Pakistan Economic Corridor (CPEC) is framed as a ‘Game Changer’ in Pakistan. There is no denial on the value of opportunities provided by CPEC, but local government has failed to develop and disseminate relevant policies for different sectors of economy. There is a general stress on propagation of special economic zones, interregional trade, power generation, infrastructure development, and Gwader port; while policies relating to important sector like cargo and transportation, automobiles, housing, banking, shipping, and other relevant industries have not surfaced yet. Most importantly, there is no plan on vocational and technical training of local human resource to meet future demand in industries to be set up in special economic zones. This study provides a documentary analysis of the news coverage and official research reports on the CPEC and argues that although CPEC boasts infrastructural developments in Pakistan, playing blind to the industry level reforms, initiatives, and policies could result in many lost opportunities for Pakistan.

KEYWORDS: CPEC, Trade, Special Economic Zone, Industrial Policy

Paper ID : 85

The Effectiveness Analysis of TRIZ Tools Applied to College Students' Competition Works

Haiyan Wang, Hongli Liang
School of Public Policy and Management, University of Chinese Academy of Sciences, Beijing, China.
E-mail(s): wanghy@ucas.ac.cn, lianghongli@ucas.ac.cn

Abstract

This paper takes 1801 innovation contest works and 401 winning entries which come from *the 7th China TRIZ Cup College Students Innovation Method Competition* as the research objects. By using the method of text analysis, the relevance of TRIZ tools, including the *Innovation Thinking Skills, Resources analysis, Functional analysis, Innovation Principles, Separation Principles, Substance-Field Resources, Standard Solutions, Prediction of Technique Evolution* , *ARIZ* , and the application field of innovation contest works are studied. Analyzing numerous innovation contest works, we also valuate what TRIZ tools are more effective and what innovation methods often help to achieve breakthrough solutions. The research are helpful for college teachers to choose appropriate TRIZ tools in their TRIZ teaching practice.

Keywords: TRIZ, the effectiveness analysis, competition works, college students

Paper ID : 86

Determinants of board structure and its impact on firm performance: An evidence of SMEs sector in Pakistan

Dr. Shrafat Ali Sair[1], Dr. Rizwan Qaiser Danish[2], Mr. Ijaz Hussain[3], Mr. Hafiz Fawad Ali[4]
[1,2,4]Hailey College of Commerce, University of the Punjab, Lahore, Pakistan
[3]School of Business Administration, National College of Business Administration and Economics, Lahore, Pakistan
E-mail(s): drshrafatali@gmail.com[1], rqdanish@gmail.com[2], hassamijaz12@gmail.com[3], fawadali94@hotmail.com[4]

Abstract

The objective of this study is to analyze the governance mechanism of SMEs by observing the board efficiency. The examination of five board characteristics e.g., board composition, board size, board activities, board leadership and the tenure of board on firm performance was investigated specifically in Pakistani context. Five hypotheses have grounded with related to these characteristics in association with firm performance. To confirm the study hypotheses, a sample of 50 SMEs were selected from the industrial region of Pakistan. Data was collected from the employee surgical industry based at Sialkot. The sampling technique used was purposive sampling. The data was collected via well-structured telephonic interviews that ensured the good response. The study results showed that all the five board characteristics are significantly related and contributed in understanding the firm performance. This study is integral in helping understand the board behavior in SMEs and hence better management control and may resolved the issue of long-term survival.

Keywords: Board of Structure, SMEs, Firm Performance, Surgical Industry

Paper ID : 87

Measuring Wine Preferences by Ensemble Learning from physicochemical properties

Shuai Luo[1], Rui Ma[2], Yichuan Wang[3], Minhao Zhang[4]*
Sheffield University Management School
E-mail(s): yichuan.wang@sheffield.ac.uk

Abstract

We proposed an innovative ensemble learning method that integrates support vector machine, recurrent neural network, extreme learning machine and random forest to predict the wine preferences based on the physicochemical properties. The weight-sum formulation was designed with accuracy-based weights and diversity-based weights. The accuracy-based weights are used to balance the divergence among the member algorithms. The higher accuracy of the member algorithm, the bigger weight is assigned. The diversity-based weights are employed to reduce the volatility of the individual algorithm and improve the robustness of the algorithm. The prediction errors were estimated by the k-fold cross validation. A case study – wine preference prediction – was employed to illustrate that the proposed method can give more accurate classifier in comparison with any sole algorithm. The result of this work is of great importance to the wine business and it can help the experts to make decisions with quicker speed and better performance.

Keywords: Ensemble learning, accuracy-based weights, diversity-based weights, k-fold cross validation, wine preference

Paper ID : 89

The Expansion of QFD theory based on Chinese culture and its application in innovative design

Wei Xiong
ZheJiang University
E-mail(s): wxiong@zju.edu.cn

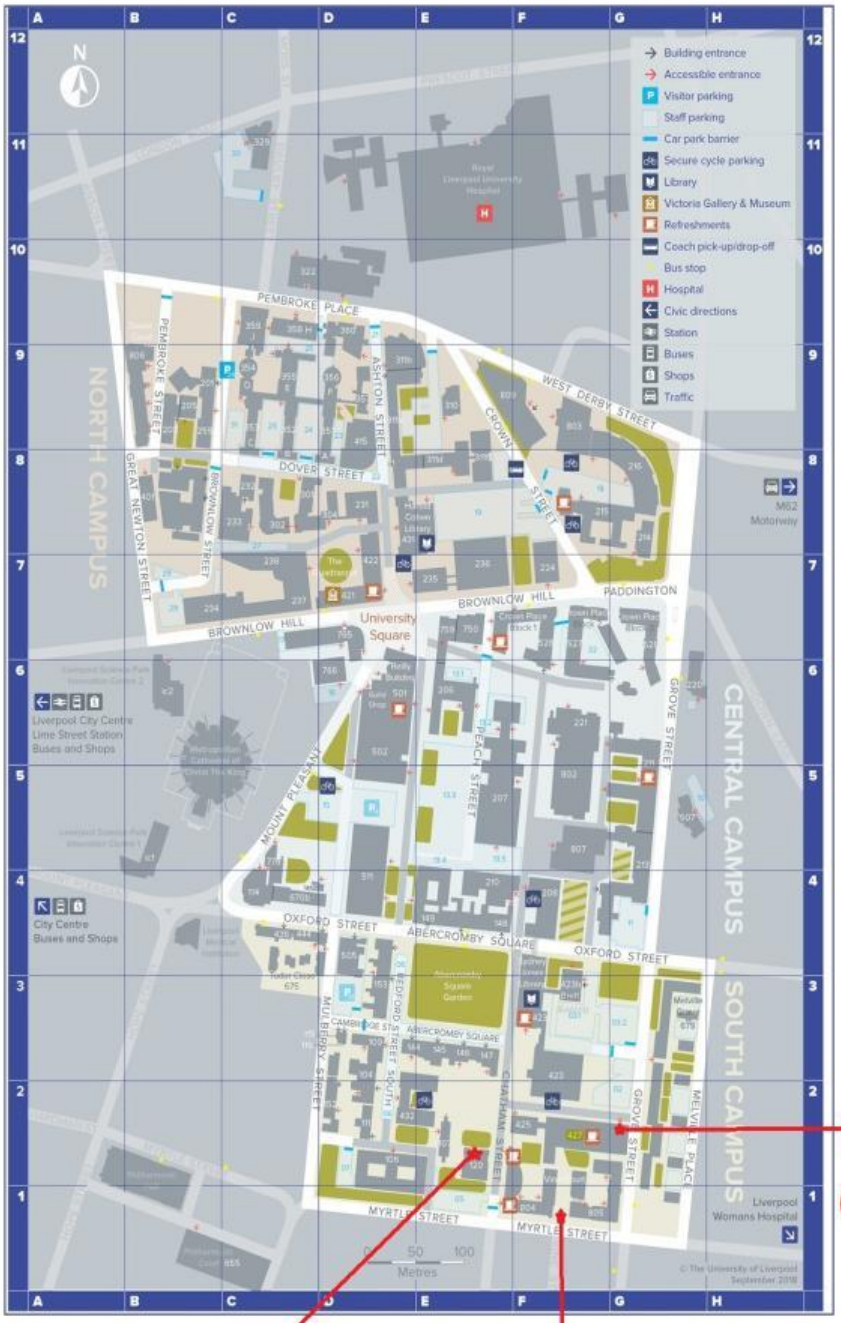
Abstract

The application of QFD theory in Chinese enterprises had appeared the problems such as the difficulty to guarantee effectively. The author found that the fundamental reason was the difference of quality culture. So for Chinese enterprise quality culture characteristics, the author studied a variety of QFD methods for Chinese enterprises. On the basis of these methods, the author proposed in the software, equipment, materials, medical, service and other fields. In this paper, the author integrated these research results and sort out the author's experience in QFD research for several decades and hundreds of academic papers that have been published in QFD research, and proposed the framework of the Chinese QFD theory and method, and formed the localization of QFD with Chinese characteristics, Finally, the application cases in the innovative design are given.

Keywords: Quality Function Deployment (QFD); quality culture; Confucian culture; the innovative design

Campus Map

The conference will be hosted in the South Campus Teaching Hub (SCTH), at the University of Liverpool. The address is: 140 Chatham St, Liverpool L7 7BA



Post-Conference Campus Tour (427-Management School)

Pre-Conference Tour - Pick up and greet (Between building 804 & 805)

Conference Venue - Reception, Sessions (120-South Campus Teaching Hub)

Conference Banquet

The conference banquet will be held at **the Athenaeum** in Liverpool city center. Its approx. 25 mins walk from the conference venue or 10 mins by car/taxi.

THE ATHENAEUM

The Athenaeum has an atmosphere unrivalled in the City of Liverpool. It provides a distinguished setting for Lunches, Dinners and Buffet Receptions – the perfect place to entertain friends, visitors and clients.

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HOW TO FIND US

Location: The Athenaeum, Church Alley, Liverpool L1 3DD
Tel: 0151 709 7770
Web: *http://theathenaeum.org.uk/*

If you need any help to find the place, please contact our onsite helpers who would be happy to help.

Organization & Acknowledgment of Contributions

2019 ICSI/GCSI

(International Conference and Global Competition on Systematic Innovation)

Dates: July 08-11, 2019, Liverpool, UK

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- International Society of Innovation Methods (I-SIM)
- The Society of Systematic Innovation (SSI)
- The University of Liverpool Management School (Local Host)
- Nottingham University Business School

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TEL +886-3-572-3200

FAX +886-3-572-3210

Address 5F,Tsing-Hua Info. Building,No.350,Sec. 2, Guan-Fu Rd, Hsinchu, Taiwan 30071, R.O.C.

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