

# **2020 IEEE International Conference on Industrial Engineering and Engineering Management (IEEM 2020)**

**Singapore  
14 – 17 December 2020**

**Pages 1-674**



**IEEE Catalog Number: CFP20IEI-POD  
ISBN: 978-1-5386-7221-1**

**Copyright © 2020 by the Institute of Electrical and Electronics Engineers, Inc.  
All Rights Reserved**

*Copyright and Reprint Permissions:* Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

***\*\*\* This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

|                         |                   |
|-------------------------|-------------------|
| IEEE Catalog Number:    | CFP20IEI-POD      |
| ISBN (Print-On-Demand): | 978-1-5386-7221-1 |
| ISBN (Online):          | 978-1-5386-7220-4 |

**Additional Copies of This Publication Are Available From:**

Curran Associates, Inc  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: (845) 758-0400  
Fax: (845) 758-2633  
E-mail: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

CURRAN ASSOCIATES INC.  
**proceedings**  
.com

## Table of Contents

### Supply Chain Management 1

|   |    |
|---|----|
| Modeling of an Industrial Ecosystem at Traditional Shipyards in Indonesia for the Sustainability of the Material Supply Chain<br><i>Yugowati PRAHARSI, Muhammad ABU JAMI'IN, Gaguk SUHARDJITO, Hui-Ming WEE</i> | 1  |
| The Optimal Choice for Local Content Requirement and Tariff Under Social Welfare Maximization<br><i>Lin GAN, Li XIAO</i>  | 5  |
| Flood Shelters Location Using P-median Model<br><i>Wichitsawat SUKSAWAT NA AYUDHYA</i>  | 11 |
| An Inventory Optimization Model Under Demand Uncertainty for Autonomous Multi-site Inventory Planning with Material Substitutability and Transshipment<br><i>Mojtaba SHAKERI, Chi XU, Puay Siew TAN</i>         | 16 |
| Dual Sourcing Problem with Capacities and Setup Cost<br><i>Xiaoqian SHI, Linlin JI, Meimei ZHENG</i>  | 21 |

### Systems Modeling and Simulation 1

|  |    |
|--|----|
| A Mixed-integer Programming Approach to Group Control of Elevator Systems with Destination Hall Call Registration<br><i>Yulun WU, Shunji TANAKA</i>  | 26 |
| Effect of Network Structure and Preference Difference on Knowledge Transfer in Inter-organizational R&D Project<br><i>Xiaonan WANG, P. GUO, D. WANG</i>  | 32 |
| Container Movement Evaluation Using System Dynamics Simulation<br><i>Fajar KURNIAWAN, Siti Nurmaya MUSA, Noor Hasnah MOIN</i>  | 37 |
| Electric Vehicle Diffusion in the Indonesian Automobile Market: A System Dynamics Modelling<br><i>Erwin Stefano LONAN, Romadhani ARDI</i>  | 43 |
| Optimization by Hybridization of Algorithms RGA and ILS to Solve the Container Stacking Problem at Tripoli-Lebanon Seaport<br><i>Nobar KASSABIAN, Zakaria HAMMOUDAN, Olivier GRUNDER, Lhassane IDOUMGHAR</i> | 48 |

### Supply Chain Management 2

|   |    |
|---|----|
| Optimal Planning of a Closed-loop Supply Chain with Recovery Options and Carbon Emission Considerations<br><i>Fareeduddin MOHAMMED, Adnan HASSAN</i>                                      | 54 |
| Choosing the Right Communication Medium for Knowledge Transfer in Global Production Networks<br><i>G. SCHUH, Andreas GÜTZLAFF, Katharina THOMAS, Niklas RODEMANN, Isabel RITTSTIEG</i>    | 59 |
| Modeling the Recall Process of Bulk-Liquid Industry: A Linear Programming Approach<br><i>Ivan GUNAWAN, Iwan VANANY, Erwin WIDODO</i>  | 64 |
| Framework for the Proactive Identification of Adaptation Needs in the Configuration of Global Production Networks<br><i>Niklas RODEMANN, Katharina THOMAS, Andreas GÜTZLAFF, G. SCHUH</i> | 69 |

|  |    |
|--|----|
| Impact of Internal Factors on the Implementation of Halal Logistics<br><i>Aries SUSANTY, Nia BUDI PUSPITASARI, Oktivia SELVINA, Sumunar JATI</i> | 74 |
|--|----|

## **Production Planning and Control 1**

|   |     |
|---|-----|
| Multi-factory Job Shop Scheduling With Due Date Objective<br><i>Jacob LOHMER, Daniel SPENGLER, Rainer LASCH</i>   | 79  |
| Risk Assessment and Treatment Planning for Energy-flexible Production Systems Using an Additional Cost Model<br><i>Stefan ROTH, Markus WEBER, Andrea HOHMANN, Gunther REINHART</i>  | 85  |
| Automated Data Acquisition and Processing for Factory Layout Planning<br><i>Dominik MELCHER, Benjamin KÜSTER, Ludger OVERMEYER</i>  | 91  |
| Planning of Available Resources Considering Ergonomics Under Deterministic Highly Variable Demand<br><i>Marco BONINI, Jan SCHUHMACHER, Augusto URRU, Jan Philipp WEZEL, Vera HUMMEL, Wolfgang ECHELMEYER</i>                      | 96  |
| Why a Systematic Investigation of Production Planning and Control Procedures is Needed for the Target-oriented Configuration of PPC<br><i>Alexander MÜTZE, Simon HILLNHAGEN, Philipp SCHÄFERS, Matthias SCHMIDT, Peter NYHUIS</i> | 103 |
| Reverse Logistics with Disassembly, Assembly, Repair and Substitution<br><i>Youcef BOUTARFA, Ahmed SENOSSI, Nadjib BRAHIMI</i>  | 108 |

## **Systems Modeling and Simulation 2**

|  |     |
|--|-----|
| Cloud-based Cyber-Physical Robotic Mobile Fulfillment Systems Considering Order Correlation Pattern<br><i>Kin Lok KEUNG, Carman Ka Man LEE, Ping Ji, Jiage HUO</i>   | 113 |
| A Simulation-based Method for Predicting the Time-varying Passenger Demand at Metro Rail Transit Line 3 Using Monte Carlo Simulation<br><i>Yogi Tri PRASETYO, Benjamin TABARES JR.</i>                         | 118 |
| Simulation Modeling of Production System Considering Human Behavior<br><i>Fansen KONG, Xiangdong KONG, Haoyang WU, Yixin ZHANG, Peidi FANG</i>   | 123 |
| Towards a European Hyperloop Network: An Alternative to Air and Rail Passenger Travel<br><i>Deep Vijay MERCHANT, Stanislav CHANKOV</i>   | 128 |
| A Cross-disciplinary Model-Based Systems Engineering Workflow of Automated Production Systems Leveraging Socio-technical Aspects<br><i>Minjie ZOU, Birgit VOGEL-HEUSER, Michael SOLLFRANK, Juliane FISCHER</i> | 133 |

## **Manufacturing Systems 2**

|   |     |
|---|-----|
| Diagnosis on Energy and Sustainability of Reconfigurable Manufacturing System (RMS) Design: A Bi-level Decomposition Approach<br><i>Amirhossein KHEZRI, Hichem HADDOU BENDERBAL, Lyes BENYOUCEF, Alexandre DOLGUI</i> | 141 |
| Industrial Wastewater Treatment Configuration: Insights from a Northern Italy Textile Manufacturing District<br><i>Marta NEGRI, Enrico CAGNO, Caterina SALEMME, Andrea TRIANNI</i>                                    | 146 |

|  |     |
|--|-----|
| A Data Model to Apply Process Mining in End-to-End Order Processing Processes of Manufacturing Companies                               | 151 |
| <i>G. SCHUH, Andreas GÜTZLAFF, Sven CREMER, Seth SCHMITZ, Arian AYATI</i>  |     |
| Small Series Production and Geometric Analysis of Sheet Metal Car Body Parts Using Forming Tools Made of Fused Filament Fabricated PLA | 156 |
| <i>G. SCHUH, Georg BERGWELER, Falko FIEDLER, Philipp BICKENDORF, Philipp SCHUMACHER</i>  |     |
| Exploring Reconfigurability in Manufacturing Through IIoT Connected MES/MOM  | 161 |
| <i>Soujanya MANTRAVADI, Jagjit SRAI, Thomas Ditlev BRUNOE, Charles MØLLER</i>  |     |

### **Decision Analysis and Methods 1**

|   |     |
|---|-----|
| Launch Strategies for Upgraded Products with Consideration of Self-cannibalization  | 166 |
| <i>Chao Nan LI, Yan CHEN, Hai Jiao LUAN, Li Shan WANG, Le Xin SUN, Tong Xin WANG, Xin LI</i>                                      |     |
| Using Classification with K-means Clustering to Investigate Transaction Anomaly   | 171 |
| <i>Xing Scott TAN, Zijiang YANG, Younes BENLIMANE, Eric LIU</i>   |     |
| Two-Stage Newsvendor Problem with Loss Aversion and Probability Weighting Effects   | 175 |
| <i>Cunwu SUN, Hongqing YE, Wei WENG, Qingwei WANG</i>   |     |
| A Multiple Layer DEA Model for Evaluating Corporate Sustainable Performance Using Lean Manufacturing Practices                    | 180 |
| <i>Willy ZALATAR, Eppie CLARK</i>   |     |
| Application of Lean Six Sigma Methodology and Queueing Theory to Minimize Systemic Variability: A Case Study from Public Services | 185 |
| <i>Felix SANTHIAPILLAI, R. M. Chandima RATNAYAKE</i>  |     |

### **Big Data and Analytics 1**

|   |     |
|---|-----|
| The Prediction of Flight Delay: Big Data-driven Machine Learning Approach   | 190 |
| <i>Jiage HUO, Kin Lok KEUNG, Carman Ka Man LEE, Kam K.H. NG, K.C. LI</i>  |     |
| Business Applications for Current Developments in Big Data Clustering: An Overview  | 195 |
| <i>Glendon HASS, Parker SIMON, Rasha KASHEF</i>   |     |
| Visual-based People Counting and Profiling System for Use in Retail Data Analytics  | 200 |
| <i>Meygen CRUZ, Jefferson James KEH, Ramiel DETICIO, Carl Vincent TAN, John Anthony JOSE, EDWIN SYBINGCO, Elmer DADIOS</i>    |     |
| Detecting Bursts in Water Distribution System via Penalized Functional Decomposition  | 205 |
| <i>Yinwei ZHANG, Kevin LANSEY, Jian LIU</i>   |     |
| SARIMA and Artificial Neural Network Models for Forecasting Electricity Consumption of a Microgrid Based Educational Building | 210 |
| <i>Meditya WASESA, Adhya Rare TIARA, Mochammad Agus AFRIANTO, Fakhri Ihsan RAMADHAN, Irsyad Nashirul HAQ, Justin PRADIPTA</i> |     |

### **Decision Analysis and Methods 2**

|   |     |
|---|-----|
| An Analysis of Decision to Retrofit Coal Based Power Plant with Carbon Capture Technology Having Uncertain Parameters | 215 |
| <i>Shalini KUMARI, Sasadhar BERA</i>  |     |

|   |     |
|---|-----|
| Prediction of Raw Material Price Using Autoregressive Integrated Moving Average<br><i>Nuthaya HANKLA, Ganda BOONSOTHONSATIT</i>                               | 220 |
| Energy Efficiency Measures and Production Resources: Towards an Integrative Classification Framework for Decision Makers<br><i>Mile KATIC, Andrea TRIANNI</i> | 225 |
| A Game-theory Based Parking Pricing Policy<br><i>Shijin WANG, Ting HU</i>   | 230 |
| Least-distance Data Envelopment Analysis Model for Bankruptcy-based Performance Assessment<br><i>Xu WANG, Takashi HASUIKE</i>                                 | 235 |
| Experimental Study on Visual Variables Influencing Icon Similarity<br><i>Shiyuan DING, Haiyan WANG, Chengqi XUE</i>   | 240 |

## **Service Innovation and Management 1**

|   |     |
|---|-----|
| Organizational Learning from Failure Can Augment Ambidexterity: Evidence from Japan<br><i>Sanetake NAGAYOSHI, Jun NAKAMURA</i>  | 244 |
| The Business Ecosystem Management Canvas<br><i>Philipp HUMBECK, Jan JAECKLE, Julia DUWE, Thomas BAUERNHANSL</i>   | 249 |
| Lean Management 4.0 Proposition for the Evolution of Managerial Criteria<br><i>Eva ROTHER, Armand BABOLI, Luc BERNARDINI</i>  | 255 |
| Business Model and Organization – Interdependencies for Customer-Centric Continuous Innovation in Subscription Business<br><i>G. SCHUH, Andreas GÜTZLAFF, Sven CREMER, Jannik LAMMERSMANN, Yuan LIU</i> | 260 |
| Measuring Information Technology Service Levels: A Literature Review<br><i>Franziska SCHORR, Lars HVAM</i>  | 265 |
| A User-centered Evaluation and Redesign Approach for E-Government APP<br><i>Danni CHANG, Fan LI, Leni HUANG</i>   | 270 |

## **Project Management 2**

|   |     |
|---|-----|
| Empirical Classification of Advanced Information Technology Towards Their Support of Leadership Behaviors in Virtual Project Management Settings<br><i>Christina MAYER, Susanne MÜTZE-NIEWÖHNER, Verena NITSCH</i>    | 275 |
| Towards an Extended Team Model for Agile Development of Complex Products<br><i>Niklas STEIREIF, Marisa SCHIRMER, Maximilian SCHNITZLER, Susanne MÜTZE-NIEWÖHNER</i>   | 280 |
| A Taxonomy for Engineering Change Management in Complex ETO Firms<br><i>Emrah ARICA, Ottar BAKAAS, Pavan SRIRAM</i>   | 285 |
| Sustainability in the Civil Construction based on Emergy Analysis Theory (EmA): A Systematic Review of Literature<br><i>Luanda LIMA, Marcelo ALENCAR, Luciana ALENCAR</i>   | 290 |
| Investigating the Effects of Modular Product Structures to Support Design Decisions in Modularization Projects<br><i>Erik GREVE, Christoph FUCHS, Bahram HAMRAZ, Marc WINDHEIM, Lea-Nadine SCHWEDE, Dieter KRAUSE</i> | 295 |

## Big Data and Analytics 2

|  |     |
|--|-----|
| A Dynamic Feedback System Analysis on the Mechanism of Shipping Freight<br><i>Xiwen BAI, Ming Qi XU, Haiying JIA</i>                       | 300 |
| Optimal Feature Selection for Support Vector Machine Classifiers<br><i>Oliver STRUB</i>  | 304 |
| News Media Sentiments and Stock Markets: The Indian Perspective<br><i>Shweta AGARWAL, Utkarsh GOEL, Shailendra KUMAR</i>                   | 309 |
| Feature Engineering for Supply Analysis in Ocean Transportation<br><i>Roar ADLAND, Vit PROCHAZKA</i>                                       | 314 |
| Using of Social Media Data Analytics for Applying Digital Twins in Product Development<br><i>Abdiladif Ahmed OLAD, Omid FATAHI VALILAI</i> | 319 |
| A Binary Linear Programming-Based K-Means Algorithm For Clustering with Must-Link and Cannot-Link Constraints<br><i>Philipp BAUMANN</i>    | 324 |

## Technology and Knowledge Management 1

|  |     |
|--|-----|
| Adoption of Information Technology in Modern Manufacturing Operation<br><i>Shu Lun MAK, Chi Ho LI, W. F. TANG, Ming Yan WU, C. W. LAI</i>            | 329 |
| Knowledge Revealing and Organizational Legitimacy: Comparisons between Different Types of Firms in China<br><i>Yan XIE, Jiaqi HUANG, Kai XU</i>      | 334 |
| Promoting the Original Innovation for Disruptive Technology<br><i>Xin ZHENG, Yali ZHANG, Liaoliao LI, Nan CHANG, Jianwu XUE</i>                      | 339 |
| How Do Innovation Intermediaries Influence Outbound Open Innovation in China? A Moderated Mediation Mechanism<br><i>Yan XIE, Kai XU, Jiaqi HUANG</i> | 344 |
| A Study on Ambidextrousness of R&D Organization in ICT Companies<br><i>Iori NAKAOKA, Yunju CHEN, Yousin PARK, Hirochika AKAOKA, Seigo MATSUNO</i>    | 349 |
| Impact of Reabsorption of Spilled Knowledge on Patent Value<br><i>Takafumi MIYAZAKI, Ryo TAKEMURA, Takuya HARADA, Noritomo OUCHI</i>                 | 354 |

## Project Management 1

|   |     |
|---|-----|
| Breakthrough Capabilities for Delivering High-performing Project Management Offices (PMOs) in Construction Enterprises<br><i>Mahmoud ERSHADI, Marcus JEFFERIES, Peter DAVIS, Mohammad MOJTAHEDI</i>       | 359 |
| How Could Antecedents to Project Collaborative Effectiveness Through Project War-Room Meetings, Develop Cohesion in Multicultural Teams: While Problem-Solving?<br><i>Adrian HEPWORTH, Sevil HEPWORTH</i> | 364 |
| Evaluation of the "Internet +" Environmental Public Welfare Project Based on Value Co-creation<br><i>Jie ZHANG, Yali ZHANG, Haixin ZHANG, Guanghui HE</i>   | 370 |

Gearing Food Manufacturing Industry Towards Lean Six Sigma Implementation: An Exploratory Study on Readiness Factors 375  
*Sarina ABDUL HALIM LIM, Nurul Najihah AZALANZAZLLAY, Ungku Fatimah UNGKU ZAINAL ABIDIN, Anjar PRIYONO*

Project Performance Evaluation System: A Case Study in a Construction Enterprise in Colombia 380  
*Sassha RICO, Luciana ALENCAR*

Application of Fuzzy Set Theory to Evaluate Large Scale Transport Infrastructure Risk Assessment and Application of Best Practices for Risk Management 385  
*Baudhi ABEYSEKARA*

### **Reliability and Maintenance Engineering 1**

Reliability and Safety Assessment of Automated Driving Systems: Review and Preview 390  
*Kuo-Wei WU, Chung-Chih LIAO, Wen-Fang WU*

An Integrated Approach for Fuzzy Failure Mode and Effect Analysis Using Fuzzy AHP and Fuzzy MARCOS 395  
*Soumava BORAL, Sanjay K. CHATURVEDI, Ian HOWARD, Kristoffer MCKEE, V. N. Achuta NAIKAN*

Mechanization of Qualitative Risk Based Inspection Analysis 401  
*Mehdi ESKANDARZADE, R. M. Chandima RATNAYAKE, Meysam NAJAFI ERSADI*

A Deterministic Analysis Method of Embedded System Based on Event-driven 407  
*Xianchen SHI, Yian ZHU, Xiangyu ZHANG, Lian LI, Zonglong QI, Jihuan DOU*

Life Prediction of Self-Locking Nut for Aeroengine Based on Survival Analysis and Bayesian Network 414  
*Zhiqiang CAI, Yuhang WANG, Huiying CAO, Zhengjie TIAN*

### **Technology and Knowledge Management 2**

Cyber-Physical Operator Assistance Systems in Industry: Cross-Hierarchical Perspectives on Augmenting Human Abilities 419  
*Mirco MOENCKS, Elisa ROTH, Thomas BOHNÉ*

Case Study for the Integrated Development of a Modular System for Vehicle Superstructures of Battery Electric Light Commercial Vehicles 424  
*G. SCHUH, Christian DÖLLE, Ramon KREUTZER, Marc PATZWALD, Jan KOCH*

The Enhancement of E-learning for the Boring Process to Leverage the Knowledge Management Maturity 430  
*Zulma Luklu II MAQNUN, Fadel MUHAMMAD, Amelia KURNIAWATI, Mochamad Teguh KURNIAWAN*

The Impact of Business Intelligence on Decision-Making in Public Organisations 435  
*Aron BERHANE, Mohamad NABEEL, Christine GROßE*

Development and Evaluation of a Blockchain Concept for Production Planning and Control in the Semiconductor Industry 440  
*Laura HERRGOß, Jacob LOHMER, Germar SCHNEIDER, Rainer LASCH*

Methodology for the Assessment of Complexity in Corporate Value Networks 445  
*Michael RIESENER, Christian DÖLLE, Julian KREß, G. SCHUH*

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



|   |     |
|---|-----|
| Digital Transformations in the Apparel Value Chain for Mass Personalization<br><i>Wasana UDUWELA, R. K. J. DE SILVA, T. D. RUPASINGHE</i>   | 450 |
| A Constrained Clustering Algorithm for the Location of Express Shops<br><i>Xilin ZHANG, Xiao LIU, Jing JIANG</i>  | 455 |
| Efficient Detection of Shilling's Attacks in Collaborative Filtering Recommendation Systems Using Deep Learning Models<br><i>Mahsa EBRAHIMIAN, Rasha KASHEF</i>                                   | 460 |
| Relative Importance of Determinants Towards Users' Privacy Disclosure on Social Network Sites by Privacy Invasion Experience Based on Construal Level Theory<br><i>Li-Ting HUANG, Jun-Der LEU</i> | 465 |
| An Integrated Scheme for Robot E-procurement<br><i>Yafei NIE, Shurong TONG</i>  | 470 |
| Customer Satisfaction with Order Fulfillment in E-Retail Supply Chains in China: An Empirical Study<br><i>Yilin XIE, Linda L. ZHANG</i>   | 475 |

### **Human Factors 1**

|   |     |
|---|-----|
| The Effect of Gender, Hand Anthropometry, Hand Dominance, and High School Grade on Hand Grip Strength in Filipino Teenagers Aged 15-18: A Structural Equation Modeling Approach<br><i>Yogi Tri PRASETYO, Rod Vincent L. CORTES, Franklin S. BAUTISTA, Kenneth C.E. PIGUING, Aaron Josh A. BERMUDEZ, Charlotte N. MONTEIRO</i> | 480 |
| Influence of Presentation Mode on User's Mental Map in Temporal Sequence Data Visualization<br><i>Wenlu WANG, Ningyue PENG, Haiyan WANG, Chengqi XUE</i>  | 485 |
| The Importance of Including Qualitative Data in Technology Evaluation - Investigating the Technology Implementation Evaluation Score (TIES)<br><i>Annika HASSELBLAD, Leif OLSSON</i>  | 489 |
| Young Consumers' Perception Towards Downstream Green Supply Chain Practices<br><i>Vaishnavy PERINPARAJAH, H. Niles PERERA, Jayani Ishara SUDUSINGHE, Uthpalee HEWAGE</i>  | 494 |
| What Makes a Robot Robotic? Application of Speed, Fluidity and Animation Principles to Define Human Versus Robotic Movement<br><i>Andrew PRAHL, Bernhard SCHMITT</i>  | 499 |
| Comparing Design Preference of Guide Road Signs by Native Arabic Speakers and International Speakers in the State of Qatar<br><i>Asma MAHGOUB, Pilsung CHOE</i>   | 504 |

### **Operations Research 1**

|  |     |
|--|-----|
| A Robust Optimisation Formulation for Post-departure Rerouting Problem<br><i>Miriam BONGO, Charlle SY</i>  | 509 |
| Job Shop Scheduling Problem Neural Network Solver with Dispatching Rules<br><i>Mun Hon SIM, Malcolm Yoke Hean LOW, Chin Soon CHONG, Mojtaba SHAKERI</i>                                | 514 |
| Portfolio Selection Utilizing Electronic Company Stocks During the Enhance Community Quarantine Period in the Philippines<br><i>Michael N. YOUNG, Godfrey AREVALO, Ezekiel MALLARI</i> | 519 |

Performance Analysis of an Open Cycle Gas Turbine Power Plant in Grid Electricity Generation 524  
*Moses KABEYI, Oludolapo OLANREWAJU*

Managing Sustainability in Electricity Generation 530  
*Moses KABEYI, Oludolapo OLANREWAJU*

### **Manufacturing Systems 1**

Energy Management: Sustainable Approach Towards Industry 4.0 537  
*A. S. M. Monjurul HASAN, Andrea TRIANNI*

Digital Twin Application for Production Optimization 542  
*Sumin JEON, Sebastian SCHUESSLBAUER*

Adaptive Task Sharing in Human-Robot Interaction in Assembly 546  
*Christina SCHMIDBAUER, Sebastian SCHLUND, Tudor B. IONESCU, Bernd HADER*

Enterprise-wide Value Stream Mapping: From Dysfunctional Organization to Cross-Functional, Collaborative Learning and Improvement 551  
*Daryl POWELL, Cristina BARTOLOME*

Design and Development of a Hydrothermal Reactor for Bio Coal Production for Application in Solid Waste Management Technologies 556  
*Michelle MUGORONJI, Mercy MANYUCHI, C. MBOHWA, Edison MUZENDA, W. STINNER, Nita SUKDEO*

### **Information Processing and Engineering 1**

Research on Layout Design of Situation Interface Based on Comprehensive Importance Evaluation of Nodes 562  
*Hao WU, Haiyan WANG, Xiaojiao CHEN, Chengqi XUE*

Exploring AI-Driven Business Models: Conceptualization and Expectations in the Machinery Industry 567  
*Carsten HAHN, Tim TRAUNECKER, Manuel NIEVER, Gustav BASEDOW*

A Pilot Study of Industry 4.0 Asset Interoperability Challenges in an Industry 4.0 Laboratory 571  
*Sune Chung JEPSEN, Thomas Ingemann MØRK, Jakob HVIID, Torben WORM*

Addressing Supply Chain Vulnerability by Supporting Emerging IT: An Analysis Based on SCOR Framework 576  
*Mengdi WU, Zhaojun YANG, Jun SUN, Xueping GONG*

A Customized Smart Medical Mask For Healthcare Personnel 581  
*Noori KIM, Joslyn Jun Wei LIM, John Jie Ming YING, Haining ZHANG, Seung Ki MOON, Joonphil CHOI*

A Spatial Framework for Extracting Suez Canal Transit Information from AIS 586  
*Gabriel FUENTES, Roar ADLAND*

### **Operations Research 2**

Performance Analysis of Greedy-based Construction Heuristics on Classical Vehicle Routing Problem 591  
*Yandong HE, Mingyao QI, Fuli ZHOU, Huilin LI*

Optimization of Capacitated Vehicle Routing Problem for Recyclable Solid Waste Collection Using Genetic and Seed Genetic Algorithms Hybridized With Greedy Algorithm 595  
*Gevorg GULOYAN, Ridvan AYDIN*

|  |     |
|--|-----|
| A Large Neighbourhood Search Approach to Airline Schedule Disruption Recovery Problem<br><i>Kam K.H. NG, Kin Lok KEUNG, Carman Ka Man LEE, Yuk Ting Hester CHOW</i>                        | 600 |
| Model for Hazardous Material Transportation Problem via Lane Reservation Under Considering Environmental Risk<br><i>Zhen ZHOU, Haoyan ZHAO</i>   | 605 |
| A Multi-objective Emergency Scheduling Model for Forest Fires with Priority Areas<br><i>Lubing WANG, Peng WU, Feng CHU</i>   | 610 |
| An Order-First Split-Second Approach to a Novel Variant of the Cardinality-Constrained Covering Traveling Salesperson Problem<br><i>Chantal SCHÖNI, Philipp BAUMANN, Norbert TRAUTMANN</i> | 615 |

### Poster Session 1

|   |     |
|---|-----|
| Productivity Evaluation of Asia Textile Industry<br><i>H. T. TSAI, T. H. HO, Chia-Nan WANG</i>  | 620 |
| Advance Selling Decision for Perishable Products in the Presence of Strategic Consumers<br><i>Yanli FANG, Zhuoyi REN, Zhaobin WEI</i>                     | 625 |
| Resource Allocation of Internet Display Advertising Considering Multiple Metric Constraints<br><i>Hanmin WANG, Xinglu LIU, Wai Kin (Victor) CHAN</i>      | 630 |
| Applying K-Means Technique and Decision Tree Analysis to Predict Taiwan ETF Performance<br><i>Keng-Chieh YANG, Wen-Ping CHAO</i>                          | 635 |
| What Core Competence Can Students Learn from Off-Campus Internship?<br><i>Feng-Ming SUI, Jen-Chia CHANG, Hsi-Chi HSIAO</i>                                | 640 |
| Internet-based Collaborative Design, Manufacturing, and Supply Chain for Manufacturing Companies<br><i>Xin YUAN, Yiwen CHEN, Qibo ZHANG, Xinguo MING</i>  | 645 |
| Personal Health Mention Identification from Tweets Using Convolutional Neural Network<br><i>Yue WANG, Xiang LI, Daniel Y. MO</i>                          | 650 |
| Optimized Layout of Emergency Monitoring for Sudden Marine Pollution Accidents<br><i>Xiaotian LIANG, Yu GUO, Weitao XIONG, Qingqing YANG, Jiang JIANG</i> | 655 |

### Poster Session 2

|   |     |
|---|-----|
| What Makes Consumers More Strategic? Evidence from an Experimental Study<br><i>Yi LIU, Qiyuan LI, Yan CHEN</i>  | 660 |
| Classification and Weighting of Strategic Projects in Organizations Under Multi-Criteria Decision-Making Situations<br><i>Fernanda SOUZA, Thais RODRIGUES, Rodolfo CARDOSO, Edwin MEZA, Carlos Frederico BARROS</i> | 665 |
| Trade-terms Based Pricing Method for Export Commodity<br><i>Shijin WANG, Jiaolong WANG</i>  | 670 |
| Research on the Relationship Between Self-identity and Organizational Citizenship Behavior of the New Generation Knowledge Workers - The Mediating Effects of Organizational Identification<br><i>Shuyan GONG</i>   | 675 |
| Research on Key Factors of Total Social Welfare System of Car Hailing Industry-Based on DEMATEL Method<br><i>Huafeng CONG, Rui MIAO</i>   | 681 |

|   |     |
|---|-----|
| A Procedure for Product Variety Reduction that Considers Linked Revenue<br><i>Tobias Kondrup ANDERSEN, Anders HAUG, Lars HVAM</i>   | 686 |
| Using Online Big Data for Determining the Importance of Product Attributes<br><i>Hanan YAKUBU, C.K. KWONG</i>   | 691 |
| An Application on Building Information Model to Procurement Strategy of Copper Raw Material with Big Data Analytics<br><i>Sheng-Tun LI, Kuei-Chen CHIU, Tsung-He CHIU</i> | 696 |

### **Supply Chain Management 3**

|   |     |
|---|-----|
| Optimal Decisions for Reverse Supply Chain Considering IERs of Dual Collection Channel<br><i>Qiaolun GU, Tiegang GAO</i>                                      | 701 |
| Risk Analysis of Upstream Halal Supply Chain in Meat Industry in Indonesia Using DEMATEL-Based ANP<br><i>Safira Hazhiyah Ikramina BUSYRA, Romadhani ARDI</i>  | 706 |
| Prioritizing Risks of Halal Meat Supply Chain in Indonesian Downstream Sector Using DEMATEL-Based ANP<br><i>Nadya RISHELIN, Romadhani ARDI</i>                | 711 |
| Supply Chain Risk Assessment of Generic Medicine in Indonesia Using DEMATEL-Based ANP (DANP)<br><i>Sukma Azzah KHARISMA, Romadhani ARDI</i>                   | 716 |
| Production and Pricing Decisions in a Product-Service System Supply Chain<br><i>Qingwei WANG, Meimei ZHENG, Wei WENG</i>                                      | 721 |
| DEMATEL-Based Analytic Network Process (ANP) Approach to Assess the Vaccine Supply Chain Risk in Indonesia<br><i>Annisa Chairani SUDARMIN, Romadhani ARDI</i> | 726 |

### **Production Planning and Control 2**

|  |     |
|--|-----|
| Simulation Optimization Framework for Online Deployment and Adjustment of Reconfigurable Machines in Job Shops<br><i>Xuechen FENG, Ziqi ZHAO, Canrong ZHANG</i>  | 731 |
| Implementing Real-time Scheduling System for a Precision Engineering Company in Singapore<br><i>Sisui NGOH, Tay Jin CHUA, Tian Xiang CAI, Ravi KUMAR KATRU, Clement TAN BENG KWEE, Xinlin LIN, Martin CHOO BOON YANG, Wei Qing LEE</i> | 736 |
| Production Decisions for Standard and Customized Products with Postponement<br><i>Xiaoqian SHI, Jie LIN, Meimei ZHENG</i>  | 741 |
| Allocation Optimization for Subscription Box Services<br><i>Ayca ERDOGAN, Ayse GUNDOGDU SENTURK, Jonathan BALASINGHAM</i>  | 746 |
| Simulation-based Assembly Line Balancing in U-shaped, Parallel U-shaped, and Parallel Adjacent U-shaped Layouts<br><i>Pheaktra DOUNG, Ronnachai SIROVETNUKUL, Jun REN</i>  | 751 |

## Supply Chain Management 4

|   |     |
|---|-----|
| Sustainability Assessment of Contract Farming Broiler Chicken Supply Chain Using Rap-Poultry<br><i>Aries SUSANTY, Nia BUDI PUSPITASARI, Ratna PURWANINGSIH, Ardina RURI SIREGAR</i> | 756 |
| Vehicle Arrangement Problem for an Automobile Carrier Terminal<br><i>Etsuko NISHIMURA, H. GUO</i>   | 761 |
| Bi-objective Multistage Decentralized Supply Chain Planning<br><i>Marjia HAQUE, Sanjoy Kumar PAUL, Ruhul SARKER, Daryl ESSAM</i>  | 766 |
| The Impact of Smart-Warehousing on a Local Foodservice Equipment- company's External Customers<br><i>Palesa KEKANA, Eric Mikobi BAKAMA, Sambil Charles MUKWAKUNGU, Nita SUKDEO</i>  | 771 |
| Impacts of Emerging Information Technologies on Supply Chains: A Systematic Literature Review<br><i>Xueping GONG, Zhaojun YANG, Jun SUN, Mengdi WU</i>                              | 776 |

## Systems Modeling and Simulation 3

|   |     |
|---|-----|
| A 0-1 Mixed-Integer Program Approach Towards Solving the Stochastic Aircraft Sequencing Problem with Constant Deceleration Rate<br><i>Jitamitra DESAI, Ashish Singh BHANDARI</i>  | 781 |
| Determining the Freight Volumes for a Decentralized Waterborne Container Transportation Service<br><i>Cyril ALIAS, Dieter GRÜNDER, Lennart DAHLKE, Jonas ZUM FELDE, Lea PUSCH</i>                                       | 786 |
| Data-driven Learning for Approximation of Nonlinear Functions with Stochastic Disturbances<br><i>Quang Minh TA, Huu-Thiet NGUYEN, Chien Chern CHEAH</i>   | 794 |
| Identifying Suitable Transshipment Points for a Decentralized Waterborne Container Transportation Network<br><i>Cyril ALIAS, Lennart DAHLKE, Ole HEERWAGEN, Dieter GRÜNDER, L. PUSCH, Jonas ZUM FELDE, Sven SEVERIN</i> | 799 |
| Modelling the Impact of COVID-19 Pandemic on a Hardware Retail Supply Chain<br><i>Abhishek SATHYANARAYANA, Nagesh SHUKLA, Firouzeh TAGHIKHAH</i>  | 807 |

## E-Business and E-Commerce 2

|   |     |
|---|-----|
| The Influence to Customer Engagement Behavior by Different Strategy for Different Objective in Online Marketing<br><i>Dongying YANG, Shuzo FUJIMURA</i>                   | 812 |
| Customer Stickiness to "Internet +" Environmental Protection Public Welfare Platforms<br><i>Guanghui HE, Yali ZHANG, Xingqiao JIANG, Jie ZHANG</i>                        | 817 |
| An Optimization Framework for On-Demand Meal Delivery System<br><i>Siddhartha PAUL, Sunil RATHEE, Jose MATTHEW, Kranthi ADUSUMILLI</i>                                    | 822 |
| Customer Experience Driven Assignment Logic for Online Food Delivery<br><i>Krishna KOTTAKKI, Sunil RATHEE, Kranthi ADUSUMILLI, Bharat NAYAK, Jose MATHEW, Saket AHUJA</i> | 827 |
| Equal Pricing or Free Pricing? The Pricing Strategies of B2C Platform<br><i>Houping TIAN, Shuang ZHENG, Chunfang JIANG, Changxian LIU</i>                                 | 832 |

Consistent Pricing or Inconsistent Pricing: A Tool to Deal with Dominant E-tailers 837  
*Houping TIAN, Chunfang JIANG, Shuang ZHENG, Changxian LIU*

## **Supply Chain Management 5**

Qualitative Aspects of Communication and Relations Between the Actors in a Supply Chain for Forest Fuel 842

*Johanna ENSTRÖM*

Determination of an Efficient Degree of Centralization in Global Production Networks 847

*G. SCHUH, Andreas GÜTZLAFF, Katharina THOMAS, Tino Xaver SCHLOSSER*

Blockchain in Supply Chains and Logistics: Trends in Development 852

*Fredrik HÖGBERG, Muhammad Al Amin RASHID OTHMAN, Christine GROßE*

Impact of Sharing Point of Sales Data and Inventory Information on Bullwhip Effect 857

*Sandun Tharaka MATHARAGE, Uthpalee HEWAGE, H. Niles PERERA*

Controlling of Migration in Production Networks 862

*G. SCHUH, Andreas GÜTZLAFF, Sven CREMER, Lars GEESMANN, Dino HARDJOSUWITO*

Supplier Selection and Order Allocation Under Disruption: Multi-Objective Evolutionary Algorithms 868

*Farnaz JAVADI GARGARI, Ehsan POURJAVAD*

## **Service Innovation and Management 2**

Affecting Factors of Consumers' Purchase Decision on Sustainable Fashion Clothing Products 873

*Hui ZHENG, Lei CHEN*

Performance Analysis for a Two-stage Queuing System with Online Service 878

*Liyang ZHANG, Li XIAO*

Impact of Halal Labeling on Brand Image on Cosmetic Product 883

*Fitra LESTARI, Hertina HERTINA, Lusiana RITIA, Irsan RIANDIKA, Ahmad MAS'ARI*

A Study on IoT-enabled Appliance Management Service Platform Business Model 888

*Tatsuya INABA*

Is a Disruptive Technology Disruptive? The Readiness Perspective Based on TOE 893

*Nan CHANG, Yali ZHANG, Di LU, Xin ZHENG, JianWu XUE*

## **Information Processing and Engineering 2**

Relating Environmental and Structural Uncertainty to Management Decision Making Style and Behavior During Information System Planning and Implementation 898

*R.R.K. SHARMA, Vinay SINGH, K.K. LAI*

A Feasible Schema Design Strategy for Amazon DynamoDB: A Nested Normal Form Approach 903

*Wai Yin MOK*

Intelligent Maintenance of Complex Equipment Based on Blockchain and Digital Twin Technologies 908

*Qian CHEN, Zhenwei ZHU, Shubin SI, Zhiqiang CAI*

Reinforcement Learning-Based Differential Evolution for Solving Economic Dispatch Problems 913

*Thammarsat VISUTARROM, Tsung-Che CHIANG, Abdullah KONAK, Sadan KULTUREL-KONAK*

A Statistical Comparison of Novel Coronavirus Cases between the Philippines and South Korea 918  
*Kianna Denise C. VILLAPANDO, Maria Angelica D. BARE, Francee Mae F. CASTRO, Angelo Luis S. DOCTORA, William Davin D. PEREZ, Michael N. YOUNG*

Evaluation of Chinese Sentiment Analysis APIs Based on Online Reviews 923  
*Tianwei TANG, Liang HUANG, Yan CHEN*

### **Big Data and Analytics 3**

Monitoring and Control of Unstructured Manufacturing Big Data 928  
*Yesheng CUI, Sami KARA, Ka C. CHAN*

Topological Data Analysis for Identifying Critical Transitions in Cryptocurrency Time Series 933  
*Patipol SAENGDUAN, Sutthipong NOISAGOOL, Farida CHAMCHOD*

GPS-Derived Measures of Freight Trucks for Rest Areas: A Case-Study Based Analysis 939  
*Ahmed KARAM, T. ILLEMANN, Kristian REINAU*

User Aggregation Models for a Video-on-Demand (VoD) System 944  
*Subrato MONDAL, Goutam SEN*

Data Quality Issues When Quantifying Costs of Complexity 949  
*Aleksandra STASKIEWICZ, Lars HVAM, Anders HAUG*

A User Segmentation Approach for UGC Platform Based on a New Lead User Identification Index System and K-means Clustering 954  
*Danni CHANG, Jing ZHAO, Fanxing ZOU, Gangyan XU*

### **Intelligent Systems**

Enablers and Barriers to the Implementation of Digital Twins in the Process Industry: A Systematic Literature Review 959  
*Matteo PERNO, Lars HVAM, Anders HAUG*

Neural Network Control of Optical Tweezers System for Manipulation of Microscopic Objects 965  
*Gulam Dastagir KHAN, Chien Chern CHEAH*

Optimization of Multilayer Design for FTTH Networks Based on Geographical Information 969  
*Kaltham AL ROMAITHI, Anis OUALI, Kin POON, Peng-Yong KONG, Beum-Seuk LEE*

Development of a Novel Control Approach for Collaborative Robotics in I4 Intelligent Flexible Assembling Cells 974  
*Aleksandar PROTIC, Ziyue JIN, Romeo MARIAN, Khalid ABD, Duncan CAMPBELL, Javaan CHAHL*

Implementation of a Bi-directional Digital Twin for Industry 4 Labs in Academia: A Solution Based on OPC UA 979  
*Aleksandar PROTIC, Ziyue JIN, Romeo MARIAN, Khalid ABD, Duncan CAMPBELL, Javaan CHAHL*

### **Decision Analysis and Methods 3**

On-Chip Democracy: A Study on the Use of Voting Systems for Computer Cache Memory Management 984  
*Nguyen Anh Vu DOAN, Akshay SRIVATSA, Nael FASFOUS, Sebastian NAGEL, Thomas WILD, Andreas HERKERSDORF*

Blockchain Adoption Time of Shipowners: A Game Theoretic Analysis 989  
*Shuyi PU, Jasmine Siu Lee LAM*

|   |      |
|---|------|
| The Implementation of the Lean Thinking Concept for Reducing Waste: A Study Case in the Leather Tanning Process<br><i>Mochammad CHAERON, Rakhmadi SENTOSA, Apriani SOEPARDI</i> | 992  |
| Data Model for Managing Product Complexity<br><i>Michael RIESENER, Christian DÖLLE, Jan KOCH, G. SCHUH</i>  | 996  |
| Evolutionary Analysis of Vaccination Strategies for Infectious Diseases Considering Neutral Strategy<br><i>Xueyu MENG, Huiying CAO, Muhammad Rashid BHATTI, Zhiqiang CAI</i>    | 1001 |

#### **Decision Analysis and Methods 4**

|  |      |
|--|------|
| Dynamic Bayesian Network Decision Model for Improving Fault Detection Procedure<br><i>Nizar CHATTI, Khaoula TIDRIRI, Tarun KUMAR BERA</i>                                      | 1006 |
| Digitizing Company Analytics – Digitalization Concept for Valuable Insights<br><i>Janne HARKONEN, Erno MUSTONEN, Joni KOSKINEN, Hannu HANNILA</i>                              | 1012 |
| Creating Transparency in the Finished Vehicles Transportation Process Through the Implementation of a Real-Time Decision Support System<br><i>Angelina SCHENK, Uwe CLAUSEN</i> | 1017 |
| Use of Analytical Hierarchy Process in Selecting the Optimum Equipment for Execution at a Construction Project<br><i>Kumar Gaurav THAKUR, Arvind KEPRATE</i>                   | 1022 |
| The Influence of Macroeconomic Variables on Philippine Stock Market Indices: A Structural Equation Model Approach<br><i>Noime FERNANDEZ, Richard LI</i>                        | 1027 |
| A Methodology for Value-oriented Strategic Release Planning to Provide Continuous Product Upgrading<br><i>Tarik SAHIN, Tobias HUTH, Joachim AXMANN, Thomas VIETOR</i>          | 1032 |
| An Approach for Systematic Planning of Project Management Methods and Project Processes in Product Development<br><i>Julian BASCHIN, Tobias HUTH, Thomas VIETOR</i>            | 1037 |

#### **Healthcare Systems and Management**

|   |      |
|---|------|
| Community Operational Research (OR) and Design Thinking for the Health and Social Services: A Comparative Analysis<br><i>Desmond WONG, Yee Lin HIEW</i>           | 1042 |
| Healthcare Energy Management: A Digital Approach<br><i>Megashnee MUNSAMY, Arnesh TELUKDARIE</i>   | 1048 |
| A Systems Approach to a Sector Productivity Intervention in the Social Services: Report on Methodology<br><i>Desmond WONG, Yee Lin HIEW</i>                       | 1053 |
| Evolutionary Game Analysis of the Quality of Elderly-care Services Based on Public-private Partnership Supply Pattern<br><i>Qiang MU, Ding WANG, Xiaonan WANG</i> | 1058 |
| The Impact of Social Media on the Quality of Doctor-Patient Interaction<br><i>Yasaman ASAYESH, Keivan SADEGHZADEH</i>   | 1064 |



## Engineering Education and Training 1

- A Research on the Training Status of EECS Students' Core Competency in University of Science and Technology 1069  
*Jen-Chia CHANG, Hsiao-Fang SHIH, Kuang-Ling CHANG*
- Gamification in Assembly Training: A Systematic Review 1073  
*Niko ULETIKA, Budi HARTONO, Titis WIJAYANTO*
- Simulation Paper Planes a Way to Teach Lean Production 1078  
*Luis A. SALAZAR, Maria Del Pilar REVUELTA MENDOZA*
- Independent Campus on Industrial Engineering Undergraduate Program in Indonesia: A Delphi Method 1083  
*Fitra LESTARI, Ismu KUSUMANTO, Salfen HASRI, Akmalulhadi*

## Safety, Security and Risk Management

- An Investigation of the Perceived Adverse Impacts and Control of Construction Noise in China 1088  
*Zhe HU, Hao HU, Weng Tat CHAN, Feng XU*
- Digital Twin for Legal Requirements in Production and Logistics based on the Example of the Storage of Hazardous Substances 1093  
*Giuseppe PEREZ, Benjamin KORTH*
- Frequency Probabilistic Risk Assessment Using Coloured Petri Nets for Telemedicine 1098  
*Kenji FUJITA, Kunihiko HIRAIISHI, Toshiaki AOKI*
- Risk Assessment for Food Safety in Chicken Slaughterhouse Industry 1103  
*Hana WAHYUNI, Iwan VANANY, Udisubakti CIPTOMULYONO*

## Manufacturing Systems 3

- Digital Twin-based Production Simulation of Discrete Manufacturing Shop-floor for Onsite Performance Analysis 1107  
*Yufan ZHANG, Yaoqi SHAO, Junfeng WANG, Shiqi LI*
- Development of a Lean Manufacturing and SLP-based System for a Footwear Company 1112  
*Victor PAUCAR, Sergio MUNIVE, Victor NUÑEZ, Eloy MARCELO LASTRA, Jose C. ALVAREZ-MERINO, S. NALLUSAMY*
- Improving the Cutting Process Through Lean Manufacturing in a Peruvian Textile SME 1117  
*Beckin ALANYA, Emily DEXTRE, Victor NUÑEZ, Eloy MARCELO LASTRA, Jose C. ALVAREZ-MERINO*
- Manufacturing Cloud Service Composition Based on the Non-Cooperative and Cooperative Game Theory 1122  
*Ehsan VAZIRI GOODARZI, Mahmoud HOUSHMAND, Omid FATAHI VALILAI, Vahidreza GHEZAVATI, Shahrouz BAMDAD*
- Reengineering Workflow for Planned Reuse of IEC 61131-3 Legacy Software 1126  
*Juliane FISCHER, Birgit VOGEL-HEUSER, Fabian HABEN, Ina SCHAEFER*
- Goal-Lever-Indicator-Principle to Derive Recommendations for Improving IEC 61131-3 Control Software 1131  
*Birgit VOGEL-HEUSER, Juliane FISCHER, Eva-Maria NEUMANN*

### **Operations Research 3**

- A Multi-Round Auction for Staff to Job Assignment Under Myopic Best Response Dynamics 1137  
*Felix MERZ, Christoph SCHWINDT, Stephan WESTPHAL, Juergen ZIMMERMANN*
- Simulated Annealing Algorithm Performance on Two-Echelon Vehicle Routing Problem-Mapping Operation with Drones 1142  
*Rahmad Inca LIPERDA, A. A. N. Perwira REDDI, Nandini Niramaya SEKARINGTYAS, Handina Boedhy ASTIANA, Bertha Maya SOPHA, Anna Maria Sri ASIH*
- A Relax-and-Solve Algorithm for the Ordered Flow-Shop Scheduling Problem 1147  
*Mostafa KHATAMI, Amir SALEHIPOUR*
- A Stochastic Programming Approach for Configuration Optimization of Reconfigurable Manufacturing Systems 1152  
*Feng CUI, Na GENG, Zhibin JIANG, Xin ZHOU*
- Robust Optimization Based Heuristic Approach for Solving Stochastic Multi-Mode Resource Constrained Project Scheduling Problem 1157  
*Ripon CHAKRABORTTY, Michael RYAN*

### **Operations Research 4**

- A Matheuristic for Practical Flights Arrival and Departure Scheduling 1162  
*Mohammad Mahdi AHMADIAN, Amir SALEHIPOUR*
- Flying Sidekick Traveling Salesman Problem with Pick-Up and Delivery and Drone Energy Optimization 1167  
*John Francis GACAL, Marco Lorenzo URERA, Dennis CRUZ*
- Multi-objective Optimization for Mixed-model Assembly Line Sequencing and Balancing in the Context of Industry 4.0 1172  
*Mehran MAJIDIAN-EIDGAHI, Armand BABOLI, Reza TAVAKKOLI-MOGHADDAM*
- An Immune Genetic Algorithm for Resource Constrained Project Scheduling Problem with Discounted Cash Flows 1179  
*Md ASADUJJAMAN, Mohammad Humyun Fuad RAHMAN, Ripon CHAKRABORTTY, Michael RYAN*
- A Hybrid Community-based Simulated Annealing Approach for Influence Maximization in Social Networks 1184  
*Tarun K. BISWAS, Alireza ABBASI, Ripon CHAKRABORTTY*
- Application of Fault Tree Analysis and Petri Net Modeling in Perishable Product Supply Chain 1189  
*Manisha BHARDWAJ, Rajat AGRAWAL*

### **Reliability and Maintenance Engineering 2**

- Jump Diffusion Process Model Considering Component Dependency in Open Source Project for Development Effort Management 1194  
*Yoshinobu TAMURA, Sugisaki KODAI, Shigeru YAMADA*
- High-Fidelity Finite Element Modelling and Simulation of Solid Resilient Tire: Application to Forklift Solid Resilient Tire 1199  
*Aruna PREMARATHNA, Supun JAYASINGHE, Kushan WIJESUNDARA, Pramila GAMAGE, Sisira RANATUNGA*

|  |      |
|--|------|
| Integrated Preventive Maintenance Improvement and Spare Part Ordering Strategy for Age Deterioration Components<br><i>Danping LIN, Carman Ka Man LEE, Wenyan GUO</i> | 1204 |
| Health State Prognostics Study Based on Extreme Learning Machine<br><i>Wenqin ZHAO, Yaqiong LV, Qianwen ZHOU</i>   | 1210 |
| Integrated Production, Maintenance and Control Chart of Supply Chain Management Under Quality Constraint<br><i>A. S. ABUBAKAR, Ame NYOUNGUE, Zied HAJEJ</i>          | 1215 |

### **Quality Control and Management**

|  |      |
|--|------|
| Development and Validation of a Failure-Cause-Searching and Solution-Finding Algorithm Based on Complaint Information from the Use Phase<br><i>Amirbabak ANSARI, Nadine SCHLUETER, Marius HEINRICHSMEYER, Manuel LOEWER</i>            | 1220 |
| A Failure Handling Process Model for Failure Management in Manual Assembly<br><i>Robin EXNER, Quoc Hao NGO, Junjie LIANG, Max ELLERICH, Robin GÜNTHER, Sebastian SCHMITT, Robert SCHMITT</i>   | 1225 |
| The Implementation of ISO 9001:2015 to Improve Quality Service: A Descriptive Study on a South African Service Organization<br><i>Marabe Hotpower MAGANA, Eric Mikobi BAKAMA, Sambil Charles MUKWAKUNGU, Nita SUKDEO</i>               | 1230 |
| The Relationship Between the Implementation of Quality Management Practices and Service Quality in the South African Financial Service Industry<br><i>Kuthula NTANZI, Alice Kabamba LUMBWE, Sambil Charles MUKWAKUNGU, Nita SUKDEO</i> | 1235 |
| An Integrated Modeling Framework for Multivariate Poisson Process with Temporal and Spatial Correlations<br><i>Cang WU, Shubin SI</i>  | 1241 |
| Total Quality Management & Customer Satisfaction in Public Hospitals in Sri Lanka<br><i>Pemal DAKSITH, Uthpalee HEWAGE</i>   | 1246 |

### **Engineering Economy and Cost Analysis**

|   |      |
|---|------|
| Operating Expense Budgeting Using Standard Activity Measurement Plan<br><i>Romeo G. MANALO, Marivic V. MANALO</i>   | 1251 |
| Time-related Differentiation of Complexity Costs Using Process Data Mining<br><i>G. SCHUH, Christian DÖLLE, Maximilian KUHN, Jan KOCH, Alexander MENGES, Christina RUSCHITZKA</i> | 1256 |
| The Effect of Geographical Factor on the Use of Combinable Containers<br><i>Haruki OGAWA, A. IMAI, K. SHINTANI, E. NISHIMURA</i>  | 1261 |

## Engineering Education and Training 2

- The Impact of SARS-CoV-2 on Engineering Education: Student Perceptions from Three Countries 1266  
*Per ÁHAG, Ying Jui HSU, Leif OLSSON, Leif SUNDBERG*
- Blackboard E-learning System Acceptance and Satisfaction Among Filipino High School Students: An Extended Technology Acceptance Model (TAM) Approach 1271  
*Yogi Tri PRASETYO, Simeon Arnold R. TUMANAN, Lance Allen F. YARTE, Mhel Cris C. OGOY, Ardivin Kester S. ONG*
- Checklist as an Effective Means of Information Delivery in On-Demand Learning 1276  
*Anand KONJENBAM, Sanetake NAGAYOSHI*

## Poster Session 3

- Optimization of Multiple Products Transportation Under the Background of Industrial Symbiosis Network 1281  
*Na GAO, Yuting LI, Yuxi MAI, Haoxuan XU*
- Process Capability Index Under Simultaneous Effects of Process Deterioration and Learning Process 1286  
*Angus JEANG, Chien-Ping CHUNG, Zih-Huei WANG*
- Advanced Planning and Scheduling System Based on Multi-resource Closed-loop Management 1291  
*Xin YUAN, Yiwen CHEN, Bo LIU, Xinguo MING*
- Influence of Six Sigma DMAIC to Reduce Time Wasting of Line Supervisor in Production Manufacturing 1296  
*Kabuya KANYINDA, Ian LAZARUS, Oludolapo OLANREWAJU*
- Digital Twin-based Framework for Green Building Maintenance System 1301  
*Wen WANG, Hao HU, JiaChun ZHANG, Zhe HU*
- Safety and Security Study for Shore Power System: State-of-the-Art 1306  
*Yaqiong LV, Xiaohua CAO, Qianwen ZHOU, Wenqin ZHAO, Kai DING*

## Poster Session 4

- Joint Strategy of Advance Selling and Resalable Returns for Fashion Products 1311  
*Xiaowen SUN, Yan CHEN*
- Research on Tourism Supply Chain Coordination Under the Background of Low-Carbon Tourism 1316  
*Xiangping WANG, Huajun TANG*
- Concept Design of a System Architecture for a Manufacturing Cyber-physical Digital Twin System 1320  
*Weidong LIN, Malcolm Yoke Hean LOW*
- Profit-driven Maintenance in Process Industries 1325  
*Lucas CORREA LEMES, Lars HVAM*
- A Simulation Study of Strategic Consumer Purchases 1330  
*TianYi GUO, SiHan WANG, Yan CHEN*
- Simulation Modeling for Inventory Planning and Control in Maintenance Systems Using Lot-for-Lot Reordering Strategy 1334  
*Mojahid SAEED OSMAN*

|   |      |
|---|------|
| Developing Knowledge Management System for Supporting Learning Activity in the Ceramics Craft Education | 1339 |
| <i>Tzu-Yun HSU, Hsien-Jung WU</i>   |      |
| Digital Maturity in Theory and Practice: A Case Study of a Swedish Smart-Built Environment Firm         | 1344 |
| <i>Jonathan STRÖMBERG, Leif SUNDBERG, Annika HASSELBLAD</i>   |      |
| The Process-Ranking Benchmarking (PRB) Model: Simplifying the IT-Procurement Decisional Process         | 1349 |
| <i>Simon OLOFSSON, Annika HASSELBLAD, Leif OLSSON</i>   |      |

**Author Index**