

April 7-9, 2020

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Welcome Message from Organizing Committee

It is our great pleasure to invite you to join our international conference - 2020 International conference on Industrial Engineering and Artificial Intelligence (IEAI 2020). This event will provide a unique opportunity for editors and authors to get together and share their latest research findings and results. We're confident that over the two days you'll get the theoretical grounding, practical knowledge, and

personal contacts that will help you build long-term, profitable and sustainable communication among researchers and practitioners working in a wide variety of scientific areas with a common interest in Artificial Intelligence and Blockchain.

On behalf of all the conference committees, we would like to thank all the authors as well as the technical program committee members and reviewers. Their high competence, their enthusiasm, their time and expertise knowledge, enabled us to prepare the high-quality final program and helped to make the conference become a successful event.

We truly hope you'll enjoy the conference and get what you expect from the conference.

Organizing Committee April 2020



Conference Introductions

Welcome to 2020 IEAI conference. This conference is organized by ACM Chapter. The objective of the conference is to provide a platform for researchers, engineers, academicians as well as industrial professionals from all over the world to present their research results and development activities in Artificial Intelligence and Blockchain.

Papers will be published in the following proceeding:

International Conference Proceedings Series by ACM (ISBN 978-1-4503-7706-5), which will be archived in the ACM Digital Library, and indexed by Ei Compendex, Scopus and submitted to be reviewed by Thomson Reuters Conference Proceedings Citation Index (ISI Web of Science).

Conference website and email: http://www.ieai.net/ and ieai@acm-sg.net



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Keynote Speakers Introductions

Keynote Speaker I



Prof. Maged M. Dessouky University of Southern California, USA

Prof. Maged M. Dessouky is a Professor and Chair in the Daniel J. Epstein Department of Industrial and Systems Engineering. His research area is transportation system optimization where he has authored over 90 refereed publications. His paper "Optimal Slack Time for Schedule Based Transit Operations" was awarded the INFORMS Transportation Science and Logistics Best Paper Prize. He is a Fellow of IISE and serves as Associate Director of METRANS, a center focused on solving important urban transportation problems. He is currently area/associate editor of Transportation Research Part B: Methodological, IISE Transactions, and Computers and Industrial Engineering, on the editorial board of Transportation Research Part E: Logistics and Transportation Review, and previously served as area editor of the ACM Transactions of Modeling and Computer Simulation and associate editor of IEEE Transactions on Intelligent Transportation Systems. He received his Ph.D. in Industrial Engineering from the University of California, Berkeley, and M.S. and B.S. degrees from Purdue University.

Keynote Speaker II



Prof. Chen-Fu Chien National Tsing Hua University, Taiwan

Dr. Chen-Fu Chien is Tsinghua Chair Professor, in the Department of Industrial Engineering & Engineering Management, National Tsing Hua University (NTHU), Hsinchu, Taiwan. He is also a Micron Chair Professor sponsored by Micron Foundation, USA. Professor Chien is the Director of Artificial Intelligence for Intelligent Manufacturing Systems (AIMS) Research Center that is one of four national AI centers sponsored by Ministry of Science & Technology (MOST), Taiwan. He is the founder and chairing professor for Decision Analysis Laboratory (DALab), the NTHU-TSMC Center for Manufacturing Excellence, and the Semiconductor Technologies Empowerment Partners Consortium (STEP Consortium), Taiwan. He received B.S. with double majors in Industrial Engineering and Electrical Engineering with the Phi Tau Phi Honor from NTHU in 1990. He received M.S. in Industrial Engineering and Ph.D. of Decision Sciences and Operations Research at UW-Madison, in 1994 and 1996, respectively. He was a Fulbright Scholar in the Department of Industrial Engineering and Operations Research, UC Berkeley, from 2002 to 2003. From 2005 to 2008, he had been on-leave as the Deputy Director of Industrial Engineering Division in Taiwan Semiconductor Manufacturing Company (TSMC). He received the Executive Training of PCMPCL from Harvard Business School in 2007. He was a Visiting Professor in Institute for Manufacturing, Cambridge University (sponsored by Royal Society, UK), Visiting Professor in Beijing Tsinghua University (sponsored by Chinese Development Foundation), Visiting Professor in Waseda University (sponsored by Japan Interchange Association Young Scholar Fellowship), and Visiting Professor in Tianjin University and Zhejiang University, China.

His research efforts center on decision analysis, big data analytics, modeling and analysis for semiconductor manufacturing, manufacturing strategy, and manufacturing intelligence. Dr. Chien and his DALab Associates have conducted in-depth university-industry collaborative research projects with the leaders of different industrial segments to validate developed solutions and served as senior consultant for leading companies including TSMC, MediaTek, Delta, and AUO. Dr. Chien has received 12 USA invention patents on intelligent manufacturing and published 6 books, more than 170 journal papers (1 HiCi) and 12 case studies in Harvard Business School. He has been invited to give keynote speech in various conferences including APIEMS, C&IE, FAIM, IEEE, IEEM, IML, ISMI, ISSM, leading universities and international companies worldwide. He is a Fellow of APIEMS, CIIE, and CSMOT. Dr. Chien received the National Quality Award, the Executive Yuan Award for Outstanding Science & Technology, three



2020 International conference on Industrial Engineering and Artificial Intelligence (IEAI 2020) Distinguished Research Awards and Tier 1 Principal Investigator (Top 3%) from MOST, Distinguished University-Industry Collaborative Research Award from the Ministry of Education, University Industrial Contribution Awards from the Ministry of Economic Affairs, the TECO Award, the 2011 Best Paper Award of IEEE Transactions on Automation Science and Engineering, and the 2015 Best Paper Award of IEEE Transactions on Semiconductor Manufacturing. He is a member of the Board of Directors for BoardTek (TWSE: 5349) and Uniflex (TWSE: 3321) and Just College UNISON Foundation.

Keynote Speaker III



Prof. Yang Xu Peking University, China

Prof. Yang Xu received his Ph.D. from Ecole Centrale de Nantes (France) in 2010. Since 2011, he has joined Peking University and became associate professor in 2013. He is visiting professor in Tsukuba University (Japan), Université Toulouse III (France), University of Buenos Aires (Argentina) and University of Edinburgh (UK). He published over 50 peer-reviewed scientific papers and many of them are published in outstanding SCI/SSCI index journals such as Computers & Industrial Engineering, Knowledge-Based Systems, Expert Systems, International Journal of Computer Integrated Manufacturing, Knowledge Organization, CIRP Annals. He is in charge of several national-level scientific projects and participate in several international academic cooperation. His research interests include industrial engineering, knowledge management and information systems, especially in mass customization modeling, optimization and applications.



Instructions for The Online Tool "ZOOM"

1. You can download the software "Zoom" from this URL: http://www.zoom.us/

2. How to join online conference in Zoom



Please click "join"

3. The Meeting ID for Morning Session and Afternoon Session



Please fill in the meeting ID 765-820-7828 and join the online conference

4. How to chat with others in Zoom:

Zoom Weeting ID: 401-526-4155	Talking:	✓ Zoom Group
Meeting Topic:	Daisy Zheng's Personal Meeting Room	
Host:	Daisy Zheng	
Invitation URL:	https://zoom.com.cn/j/4013264155	
	Copy URL	
Participant ID:	48	
Join Audio Computer Audio Connected	Share Screen	
		To: Everyone 🗸
↓ ∧ Mute Start Video Invite	Anage Participants Share Screen Chat Record End Meeting	Type message here

You can click "**Chat**" first.

Then, you can click "**everyone**" to choose who you want to talk with.



5. How to raise our hands and ask questions in Zoom:

	Talking:		~ DZ	Participants (2)
Meeting Topic:	Daisy Zheng's Personal Meeting Ro	bom	DY	Dan Yang (Host)
Host:	Daisy Zheng			
Invitation URL:	https://zoom.com.cn/j/401326415	5		
	Copy URL			
Participant ID:	48			
Join Audio Computer Audio Connected	share Screen	Invite Others		
			Mut	e Me Raise Hand

If you have any problems during the conference, you can click "raise your hands" or

use "**chat** " to communicate with the conference secretary and the conference secretary will help you.

When you have questions about keynote speeches, you can also use "raise your

hands".

After the keynote speech is over, keynote speakers will answer your questions.



6. How to share your screen

Zoom Meeting ID: 401-326-4155 0 Talking: Meeting Topic: Daisy Zheng's Personal Meeting Room Host: Daisy Zheng Invitation URL: https://zoom.com.cn/j/4013264155 Copy URL Participant ID: 40 Join Audio Share Sci Invite Others Computer Audio Connected **1 +**+ Ŷ \bigcirc Ų ~ ~ Start Vide Invit Manage Participants Share Screen Reco Chat

When you do your presentation, you need to share your screen.

You can click "share screen".

7. How to stop sharing your screen



When your oral presentation is over, you can click "stop share".



Presentation Instructions

Instructions for Oral Presentations

Materials Provided by the Presenters:

PowerPoint or PDF Files

Duration of each Presentation (Tentatively):

Regular Oral Presentation: about 12 Minutes of Presentation and 3 Minutes of Question and

Answer.

Best Presentation Award

One Best Presentation will be selected from each presentation session, and the Certificate for Best Presentation will be awarded after each session.



Schedule for Conference

Tips: The time in the schedule is according to Japan time

April 7, 2020 (Tuesday) Room ID: 765-820-7828			
Online Test			
	10:00- 10:10	Prof. Maged M. Dessouky	
	10:10- 10:20	Prof. Chen-Fu Chie	
	10:20- 10:30	Prof. Yang XU	
	10:30- 10:50	Presenters of Session 1	
	10:50- 11:10	Presenters of Session 2	
10:00- 15:00	11:10- 11:30	Presenters of Session 3	
	14:00- 14:20	Presenters of Session 4	
	14:20- 14:40	Presenters of Session 5	
	14:40- 15:00	Presenters of Session 6	
	flex time	Any questions about the test,	
		please contact the staff at other time on April 7	
	April 8,	2020 (Wednesday) Room ID: 765-820-7828	
		Morning Session	
	9:30-9:40	Opening Remarks	
	9:40-10:25	Keynote Speech I	
		Title: An Online Cost Allocation Model for Horizontal Supply Chains	
		Prof. Maged M. Dessouky, University of Southern California, USA	
		Keynote Speech II	
9:30- 12:05	10:25-11:10	Title: Taiwan's Efforts for Transformation via Industry 3.5 as Hybrid Strategy empowered by AI & Big Data Analytics for Smart Manufacturing	
		Chair Prof. Chen-Fu Chie, National Tsing Hua University, Taiwan	
	11:10-11:20	Take a Break	
		Keynote Speech III	
	11:20-12:05	Title: Data Supply Chain Management for Data Governance and Operation	
		Prof. Yang XU, Peking University, China	
	12:05-13:00	Lunch	



Afternoon: Session 1 & Session 2			
13:00– 18:00	13:00- 15:30	Session 1 (Room ID: 765-820-7828)	
		M50063, M50120, M50136, M50026, M50001-A	
		MS0064, MS0086, MS0062, MS5003, MS0044	
	15:30-15:45	Take a Break	
		Session 2 (Room ID: 765-820-7828)	
	15:45- 18:00	MS0057, MS0004, MS0065, MS0066	
		MS0025-A, MS0130, MS0078, MS0007, MS0005	

April 9, 2020 (Thursday)			
Morning: Session 3 & Session 4			
		Room 1 (Room ID: <mark>765-820-7828</mark>)	Room 2 (Room ID: <mark>606-418-2387</mark>)
9:30- 11:45	9:30– 11:45	Session 3 MS0029, MS0053, MS0071, MS1001, MS0051, MS0056, MS0070, MS0041	Session 4 MS0049, MS0052, MS0099-A, MS0122, MS5011, MS6001, MS0126, MS5012, MS3001
	11:45– 13:00	Lunch	
Afternoon: Session 5 & Session 6			
	13:00- 16:00	Session 5 (Room ID: 765-820-7828) MS0012, MS0128, MS0079, MS0129, MS0077, MS0017, MS0137, MS0042, MS0013, MS0061-A, MS0106, MS0036	
13:00- 18:45	16:00-16:15	Take a Break	
	16:15– 18:45	Session 6 (Room ID: 765-820-7828) MS0090, MS0111, MS0131, MS0133, MS0040, MS0045-A, MS0091, MS0043, MS0082, MS0092	



Morning Session (Wednesday)

Morning, April 8, 2020

Time: 9:30~12:05 (Japan time)

Online-Meeting ID: 765-820-7828

Opening Remarks (9:30-9:40)

Addressed by Chair Prof. Chen-Fu Chien from National Tsing Hua University, Taiwan

Keynote Speech I (9:40-10:25)

Title: An Online Cost Allocation Model for Horizontal Supply Chains Prof. Maged M. Dessouky University of Southern California, USA

Abstract— Numerous problems exist inside the logistics sector, including low capacity usage, excessive packaging, high energy consumption, low work force welfare, etc. Among efforts that target these deficiencies for improvement, horizontal cooperation stands out as the one that has seen both theoretical development and real world application. In particular, the pooling of transportation networks helps companies to reduce and share operating costs and alleviate the impact on traffic congestion by reducing the number of total vehicle miles. In the freight transportation industry, however, such cost sharing systems are still in their infancies. One of the biggest challenges of implementing a freight cost sharing transportation system is how to fairly allocate the cost to each participant in the cooperation. Yet, this problem remains rarely studied in the literature. Also, lean manufacturing and just-in time (JIT) delivery constraints challenge us to consider the cost sharing transportation system in a dynamic environment, where new customers request service in real time. Indeed, the problem of allocating costs in a real-time cost sharing transportation system is highly nontrivial and is ranked among the top impediments for successful horizontal cooperation. Therefore, an online cost allocation mechanism addressing dynamic vehicle routing problem is studied in this research.



2020 International conference on Industrial Engineering and Artificial Intelligence (IEAI 2020) Keynote Speech II (10:25-11:10)

Title: Taiwan's Efforts for Transformation via Industry 3.5 as Hybrid Strategy empowered by AI & Big Data Analytics for Smart Manufacturing Chen-Fu Chien

Tsinghua Chair Professor & Micron Chair Professor

Department of Industrial Engineering & Engineering Management,

National Tsing Hua University, Hsinchu 30013, Taiwan

Director, Artificial Intelligence for Intelligent Manufacturing Systems (AIMS) Research Center, Ministry of Science & Technology, Taiwan

Abstract— Global manufacturing paradigm is shifting as leading nations reemphasizing the importance of advanced manufacturing such as Industry 4.0 by Germany and AMP in USA. Taiwan has been using big data analytics, artificial intelligence, and smart machinery to upgrade its manufacturing, including establishment of four AI centers sponsored by Ministry of Science and Technology. On one hand, driven by Moore's Law, semiconductor manufacturing is one of the most complex industries for continuous migration of advanced technologies for manufacturing excellence, in which most of the visions for smart manufacturing are realized. On the other hand, while semiconductors are key components for various products, there are significant gaps to enable smart production for downstream industries such as electronics manufacturing service companies where assembly operations are performed in flow lines, facing challenges for small-lot sized and high-mix productions. Furthermore, supply chain management becomes increasing critical for mass-customization via virtual vertical integration of the semiconductor supply chain and digital transformation for the industry ecosystem. Industry 3.5 was proposed as a hybrid strategy between the best practice of the existing Industry 3.0 and to-be Industry 4.0 to address fundamental objectives for smart manufacturing while employing artificial intelligence and big data analytics as means objectives for manufacturing intelligence solutions. This speech will use a number of empirical studies employing artificial intelligence, big data analytics, optimization, and intelligent decision for validation of the proposed Industry 3.5. This talk will conclude with discussions of the implications of Industry 3.5 as alternative for Industry 4.0 to empower humanity in the ongoing industrial revolution.



Break Time: 11:10-11:20



2020 International conference on Industrial Engineering and Artificial Intelligence (IEAI 2020) Keynote Speech III (11:20-12:05)

Title: Data Supply Chain Management for Data Governance and Operation Yang XU

Peking University, Beijing, China

Abstract— With the increasing innovation of cloud computing, big data, mobile internet, Internet of Things, artificial intelligence, block chain and other technologies, digitalization, networking and intelligence have further developed, having important effects on global manufacturing, distribution and consumption activities, as well as economic operating mechanisms, social lifestyles and national governance capabilities.

The characteristics of magnanimity, diversity and high speed of data in this new era make traditional data governance methods challenged. The problem of data quality in data integration and analysis is becoming increasingly important. The openness and sharing of data make security and privacy issues more prominent. Therefore, it is necessary to build scientific and applicable data governance and operation system to better ensure data quality and security privacy, so as to realize data capitalization.



Lunch Time 12:05-13:00



Oral Presentation Abstracts (Wednesday)

Session 1 (Room ID: 765-820-7828)

Tips: The schedule for each presentation is for reference only. In order not to miss your presentation, we strongly suggest that you attend the whole session.

Afternoon, April 8, 2020 (Wednesday) Time: 13:00-15:45 (Japan time) Online-Meeting ID: 765-820-7828

MS0083 (Japan time 13:00-13:15)

Agile Scrum Adoption of the Application Development Projects of Company C Janina Elyse Reyes¹ and **Grace Lorraine Intal²** 1. Technological Institute of the Philippines, Philippines; 2. Mapua University, Philippines

Abstract— Company C has incurred 31 percent of delayed projects for more than three months due to the method of applying the Agile practices. The study assesses which among the Agile practices should Company C improve on to meet its project timeliness. Company C was evaluated against other IT companies, namely Company A, B and D based on how in-depth the Agile practices were applied in the company using one-way ANOVA to test the difference of means of the companies on each Agile practice. The Agile practices that Company C excels and needs improvement were obtained. A binary logistic bootstrap regression is performed to determine which Agile practices positively affect in improving the project timeliness of Company C. Based on the identified best implementation of the Agile Scrum practice in Company C from one-way ANOVA, and the positive and negative coefficients in regression, the practices that should be maintained and improved were obtained for the formulation of the Agile framework of Company C. To improve project completion rate, Company C should improve on the following practices: increasing frequency of evaluating backlog items at least every other sprint, limiting stand-up meeting to 15 minutes, creating separate implementation task, conducting sprint planning with key persons, consistent iteration length, more frequent iteration demos, performance of unit testing, understanding architectural design and implemented by the team, performing pair-programming on key portions, collaborating more frequently of team members and using of formal written document as supplement for informal communication should be implemented.



MS0120 (Japan time 13:15-13:30)

Lens Quality Inspection using Image Processing and Machine Learning Suriya Natsupakpong and Nahpat Nithisopa

Institute of Field Robotics / King Mongkut's University of Technology Thonburi, Thailand

Abstract— This research proposes a system to inspect defective lenses with a polarization technique by using image processing and machine learning. Currently, a skilled operator checks the lens quality with the polarization method by eye and decides whether or not a lens is good (OK) or not good (NG). A 'not good' lens has a circle or a line appearing in the stress pattern of the lens. This research designs and develops a lens quality checking system with machine learning by simulating and prototyping a machine to experiment and collect persistent data, using the camera to capture and analyze images with image processing and machine learning techniques to decide on the lens quality in the computer. The experimental results show that the proposed system with a trained model with data augmentation and image preprocessing can achieve performance testing with 97.75% accuracy.

MS0136 (Japan time 13:30-13:45)

Automated Monitoring and Behavior Analysis for Proactive Security Operations Vitsunee Teeraratchakarn and Yachai Limpiyakorn Chulalongkorn University, Thailand

Abstract— This research presents a method for discovery of malware trapped in Honeypot bait. The focus is the network intrusion on the Unix or Linux operating system. A process flow is introduced to facilitate collecting, analyzing, and classifying cyberattack patterns. Log management and analytics are performed with the Elastic Stack or formerly known as ELK. The data logs (cowire.log) are periodically collected from Honeypot, then they will be filtered, formatted, and inspected through the execution of shell scripts. To detect suspicious commands, a set of rules containing groups of commands is defined. These commands seem to cause the organization's assets vulnerable or harmful. If a command is found matching the command risk group, the system will analyze for its attack pattern by querying VirusTotal database. VirusTotal is a free Sandboxing service for analyzing suspicious files or URLs online. The API will return analysis reports all the antivirus application engines that have previously scanned the suspicious file or URL. The experimental result in this work reported 86% of URLs or files that belong to the command risk groups are considered as threats. The analytic results would contribute to the organization's security policies and proactive security operations development afterwards.



MS0026 (Japan time 13:45-14:00)

Blockchain Technology Adoption: Examining the Fundamental Drivers

Jerry Li

ADS Management Research, Hong Kong

Abstract— Identifying and quantifying the drivers for adopting blockchain technologies are important for developing effective launch plan. Technology Acceptance Model (TAM) and its derivatives have been used for this purpose. However, some of these models only use a few standardized, predetermined independent variables to collectively represent the drivers. Low predictive power of TAM leads to questions on whether this restriction may detrimentally constrain the exploration of other driving factors. Some other extended models with higher R² are considered impractical and lack of theoretical foundations. This paper demonstrates that reasonable predictive power can be achieved even with simple, practically implementable model when research targets are sampled and segmented properly. By employing a more fundamental theory, this study has also included additional variable that would normally not be considered in TAM.

MS0001-A (Japan time 14:00-14:15)

An Examination of Online Sports Gambling Using Theory of Planned Behaviour

Ho Keat Leng¹, Yi Xian Philip Phua¹, Heetae Cho¹, Yen-Chun Lin¹, Do Young Pyun² and Hyungil Harry Kwon³
1. Nanyang Technological University, Singapore; 2. Loughborough University, United Kingdom; 3. Chung-Ang University, South Korea

Abstract— Gambling is a popular recreational activity in Singapore with more than 50% of its population aged 18 and above having gambled at least once a year. Of particular concern, pathological gamblers in the country are more likely to engage in sports gambling. With the growing popularity of online gambling, this study aims to examine online sports gambling in Singapore using the Theory of Planned Behaviour. 150 respondents from the general population were recruited for this study. The respondents reported a mean of 37.6 years of age with 95 respondents (63%) of female gender. Respondents completed a survey instrument measuring their Attitudes, Subjective Norms, Perceived Behavioural Control and Intention related to online sports gambling. All four scales had good internal consistency with Cronbach alpha coefficients of .89 for Attitude, .91 for Subjective Norms, .85 for Perceived Behavioural Control and .86 for Intention respectively. Multiple regression analysis was used to assess the ability of Attitude, Subjective Norms and Perceived Behavioral Control to predict Intention to participate in online sports gambling. The total variance explained by the model was 38.3%, F (3, 146) = 31.88, p < .01. The analysis showed that Attitude towards online sports gambling (β = 0.45, p < .01) and Subjective Norms (β = 0.18, p < .10) predict Intention but not Perceived Behavioral Control (β =.06, p > .10). This suggests that government policies that aim to curb or prevent excessive gambling should focus on these variables.



MS0064 (Japan time 14:15-14:30)

A Deep Learning-based Approach for Human Posture Classification Jui-Sheng Hung, Pin-Ling Liu and Chien-Chi Chang National Tsing Hua University, Taiwan

Abstract— Lifting posture is considered as a leading factor in low back injuries in the workplace. Hence, it is necessary to evaluate the risk of various lifting tasks. Classifying postures is important before performing an ergonomic task assessment. Recently, many studies have revealed that the deep learning method has a high accuracy in identifying human postures. However, few studies have explored how the deep learning method can be applied to classify different postures during a lifting task. The objective of this study was to develop a deep learning technique-based model for classifying three states of postures (squatting, standing and stooping) during a lifting task.

A dataset comprising 2,600 various static images (squatting, standing and stooping) taken from 0° and 90° camera view angles and their corresponding 3D joint coordinate data recorded by the marker-based motion tracking system was used in this study. The images were randomly divided into training (1,300 images), validation (650 images) and testing (650 images) datasets. After all of the images were cropped to a fixed size, the training dataset was processed in the neural network as the input, and the validation dataset was used to revise the weight of the model while training to build the classifying model. Finally, the testing dataset was processed as input for classifying three static postures using the proposed model. A classification based on the 3D coordinate data captured by the marker-based motion tracking system was used as the reference to validate the accuracy of this classifying model.

Overall, the model developed in this study reached 91.23% accuracy. The accuracy of correctly classifying the squatting, standing and stooping postures is 94.35%, 98.33% and 75.86%, respectively. In addition, this model showed a nearly equivalent accuracy for identifying the images taken from 0° (91.64%) and 90° (90.86%) cameras. The results of this preliminary test showed that the deep learning method has the potential to classify different static postures within a lifting pattern.

MS0086 (Japan time 14:30-14:45)

Ambuquick: Mobile-based Ambulance Sharing System Kay Veronica Bacit, Christien Camu, Jesus Paulo C. Hordejan and **Grace Lorraine Intal** Mapua University, Philippines

Abstract— Ambuquick is a mobile application for Android mobile phones which aims to provide fast emergency response using private ambulances. The platform will improve the traditional way of calling an ambulance through landline during emergency and non-emergency cases. Users and system requirements were identified through interviews with private ambulance owners, staff as well as customers/patients. The application also aims to provide the customers/ patients with at minimal cost of interfacility transfer. The business model as well as proposed business processes were presented to determine the components needed for the development of the application.



2020 International conference on Industrial Engineering and Artificial Intelligence (IEAI 2020) MS0062 (Japan time 14:45-15:00) Creation A Strategic Plan for Supporting Digital Transformation Thanchanok Tongskulroongruang and Parames Chutima Chulalongkorn University, Thailand

Abstract— Preparation for the transformation to digital technology that is an important part of an organization needs to adapt to keep up with globalization. The objective of this research is to study the changes in digital technology to make a strategic plan to support the digital system in the case study of a factory in accordance with Thailand 4.0 policy. To reach this goal, this study applies SWOT analysis and PEST analysis for analyzing the factory environment. In addition, the key factor of this research is the Thailand 4.0 policy refers to the government framework. The result is a work plan to adjust the factory to be ready for digital transformation.

MS5003 (Japan time 15:00-15:15)

Data Augmentation Using Generative Adversarial Networks for Electrical Insulator Anomaly Detection Lei Luo¹, William Hsu¹ and Shangxian Wang²

1. Kansas State University, USA; 2. Johns Hopkins University, USA

Abstract— Electrical insulators, which are widely used for electricity transmission, are prone to damage and need constant maintenance. Traditionally, the inspection job is time-consuming and dangerous as workers have to climb electrical towers to access insulators. However, deep learning, which offers a safe and quick way to automate inspections, requires large amounts of data. Generative adversarial networks (GANs) are introduced as a novel approach to augmenting data. However, traditional state-of-art GANs are either incapable of generating high quality images, or fail to generate minority class images when minority class examples are very infrequent. In order to mitigate drawbacks of existing GANs, a novel GAN model, Balancing and Progressive GANs (BPGANs), was proposed for effectively making use of all classes information and generating high quality images simultaneously. Results show that PGANs, StyleGANs, and BPGANs were able to generate high-resolution images and improve classification performance. PGANs achieved the better results than BPGANs. This may be because BPGANs only provides 2 additional latent codes since it is a binary classification, having little effect on generating desired images. BPGANs seemed to have difficulties generating class-specific images, which might be because that the classification loss is too little compared to the source loss and optimization was more focused to optimize the source loss. This indicates that learning representations of data progressively from low resolution to high resolution is an effective approach, however, embedding class label information in the fashion of AC-GANs and BGANs might not be appropriate for augmenting binary class data sets.



MS0044 (Japan time 15:15-15:30)

A Decision-making Approach under Hesitant Fuzzy Information

 ${\bf Baodong}\,{\bf Li^1},\,{\rm Yu}\,{\rm Yang^1},\,{\rm Sheng}\,{\rm Wang^1}\,{\rm and}\,{\rm Jiafu}\,{\rm Su^2}$

1. Chongqing University, China; 2. Chongqing Technology and Business University, China

Abstract— For the multiple attribute decision-making problem, the decision-making approach which considers hesitant fuzzy decision information and unknown attribute weights is investigated. Primarily, the formed vectors of alternative, positive and negative ideal direction are defined. Subsequently, a bidirectional projection based on hesitant fuzzy information is established. Simultaneously, the improved closeness degree equation is proposed. Further, an attribute weight determination model which maximizes the closeness degree and entropy is constructed. In the last, an illustrative example is provided to demonstrate the validity and feasibility of the proposed approach.



Break Time 15:30-15:45



Oral Presentation Abstracts

Session 2 (Room ID: 765-820-7828)

Tips: The schedule for each presentation is for reference only. In order not to miss your presentation, we strongly suggest that you attend the whole session.

Afternoon, April 8, 2020 (Wednesday) Time: 15: 45-18:00 (Japan time)

Online-Meeting ID: 765-820-7828

MS0057 (Japan time 15:45-16:00)

Pump Scheduling for Water Supply Production using Mathematical Programming Chansiri Singhtaun and Wichitra Rungraksa Kasetsart University, Thailand

Abstract— This research proposes a mathematical model and a solution for a pump scheduling problem applied in a water supply production plant of the Provincial Waterworks Authority so that the minimum electricity cost is achieved. The branch and cut algorithm in OpenSolver is used to solve the problem. Five pump scheduling scenarios are studied. In the first scenario, the pump scheduling program is implemented in the present production system without production condition changes. In the other scenarios, four main factors are adjusted to analyze the effect on the electricity cost. These factors are the minimum volume of water in a clear water tank, the stock of finished water, the piping capacity, and water demand. The results of the first scenario show that the proposed pump schedules can reduce the electricity cost by 7.87%. The results of the other scenarios indicate that all main factors, except the capacity of the pipe line affect the pump schedules and the electricity cost. The experimental results of these four scenarios yield significant information in regard to production system improvement.



2020 International conference on Industrial Engineering and Artificial Intelligence (IEAI 2020) **MS0004 (Japan time 16:00-16:15)** Strategic Design for Warehouse 4.0 Readiness in Thailand Ganda Boonsothonsatit, **Nutthaya Hankla** and Salinee Choowitsakunlert King Mongkut's University of technology Thonburi, Thailand

Abstract— In era of the growth of Thailand economy, industrial warehouses have become an essential need. They have been recently strengthened using technology 4.0 (i.e. robotics and internet of things) to enhance competitiveness and competitive advantages. The so-called warehouse 4.0 are operated productively when well-designed with lean concept along its supply chain (warehouse 4.0 readiness). It is initiated at the strategic level. It requires an organizational policy to emphasize warehouse performance indicators. Their related data is defined and acquired to be analyzed and formulated into mathematical equations. They are subsequently configured and simulated before verified and validated in an industrial case.

MS0065 (Japan time 16:15-16:30)

The Development of Machineries and Technologies to Support Digital Transformation Chanikan Musikthong and Parames Chutima Chulalongkorn university, Thailand

Abstract - Digital technology has become an important role in organization development. Therefore, it should be aligned with the policy of Thailand Industry 4.0 which helps the country drive forward and is an implementation model for government section, state enterprises, and private section. This policy can help them work efficiently, raise their business value and increase their potential as well as their efficiency of business operation. The case study factory, Security printing business, needs to be researched and be analyzed on an operational plan preparing for Digital transformation. An essential component for the state enterprises in the manufacturing industry is the preparation of automated machinery, digital and innovation technologies with the foundation of a flexible manufacturing system, focusing on the change of working process to Smart Factory. It integrates automated machinery and operators with connected equipment through the network, which covers data collection, controllability, communication, and system operation. So, it prevents the problem of fragmented data in the factory departments when monitoring the status of devices in real-time. This study presents a development plan of machineries and technologies to support digital transformation to apply in organizations such as manufacturing information, machinery integration, security track trace and RFID system to be ready for production and inventory management systems. Furthermore, the factory will be able to support the digital system efficiently as well as to adjust changes in the market in terms of providing fast service and advanced technology to be survived in the future.



2020 International conference on Industrial Engineering and Artificial Intelligence (IEAI 2020) **MS0066 (Japan time 16:30-16:45)** Predicting Remaining Useful Life of Ball Bearing Using an Independent Recurrent Neural Network **Ren-Jieh Kuo** and C. H. Li National Taiwan University of Science and Technology, Taiwan

Abstract— Planning maintenance of facilities is an important role for production line. From preventive maintenance to predictive maintenance, the main purpose is cost down by reducing the chance of the unexpected shot down. Thus, this study intends to apply independent recurrent neural network (IndRNN), which is a kind of deep learning technique, and apply it to predict remaining useful life for the ball bearings using vibration signals. The result of the proposed method is compared with original RNN. The experimental results indicate that IndRNN is able to perform better than the other method in terms of score.

MS0025-A (Japan time 16:45-17:00)

RGV Control Problems in a TFT-LCD Bay

Ying-Chin Ho¹, Chih-Feng Chou¹ and Teng-Sheng Su²

1. National Central University, Taiwan; 2. Chaoyang University of Technology, Taiwan

Abstract— The problem environment of this study is a TFT-LCD bay that has an in-line stocker system and a Rail-Guided Vehicle (RGV) system. In this study, we address its RGV control problems. Three RGV control problems are identified and stduied. They are task determination problem, I/O point-clearing problem, and port-clearing problem. Different control rules are developed for each problem. The purpose of the task determination problem is to determine whether the next task of an RGV is an I/O point-clearing problem or a port-clearing problem. The puppose of an I/O point-clearing problem is to determine whether the next task is an I/O point-clearing task. And, the purpose of a port-clearing problem is to determine which port an RGV should visit to perform a clearing task if its next task is an I/O point-clearing task. And, the purpose of a port-clearing problem is to determine task. Simulations were conducted to undersating the performance of the proposed rules in throughput, mean flow time of parts and mean tardiness of parts. The authors hope the results of this study can assist TFT-LCD manufacturers in improving the performance of their TFT-LCD plants.



MS0130 (Japan time 17:00-17:15)

Thailand Automotive Industry: Road to Smart Manufacturing

Sasiwimon Suebsook¹, Singha Chaveesuk² and Wornchanok Chaisoonthorn²

1. Cope Consulting and Development LTD., Thailand; 2. King Mongkut's Institute of Technology Ladkrabang, Thailand

Abstract— Rapid ICT growth has resulted in many technologies such as cloud computing, the Internet of Things (IoT), and big data. These innovations now reach almost all sectors including automotive sector which is one of the main industries in Thailand, In order to advance research and implementation of smart manufacturing , authors present a conceptual framework of smart manufacturing. Core innovations such as IoT, Cyber Physical Systems and Visual Analytics for Smart Manufacturing Systems will be captured on the basis of demonstrative scenarios. Also highlighted are today's challenges and future prospects.

MS0078 (Japan time 17:15-17:30)

Al-based Automatic Optical Inspection of Glass Bubble Defects Jing-Wen Wang, **Chih-Chiang Wang** and Tsung-Chieh Cheng National Kaohsiung University of Science and Technology, Taiwan

Abstract— Automatic Optical Inspection (AOI) offers a range of solutions to meet the requirements of every production facility, attracting significant interest of manufacturers of various industries. One important AOI application in the glass industry is to detect bubble defects in spherical glass, especially those used for making high-end lenses. Nevertheless, the AOI process must make the inspection decision in a reliable manner. Another challenge is that glass bubble defects are nearly transparent and can be captured by cameras only from certain viewing angles and with the aid of a specially engineered lighting mechanism. In this paper, an Artificial Intelligence method based on AOI (AI-AOI) is proposed to address the need of the glass industry as aforementioned. In specifics, our proposed method employs (1) a specially designed back-lighting mechanism to illuminate the hardly visible glass bubble defects, (2) Otsu thresholding image-segmentation method to obtain distortion part and core part of the defects and eliminate the fake defects caused by dust particles, and (3) a novel AI-based bubble-defect detection method capable of capturing the bubble defects as small as a few millimeters in diameter. The initial experimental results validate the feasibility of the proposed AOI method with an accuracy of 95%. If we exclude factors such as scratches by humans or the presence of dust particles in the inspection room, our method can achieve a recognition rate of 100%.



2020 International conference on Industrial Engineering and Artificial Intelligence (IEAI 2020) **MS0007 (Japan time 17:30-17:45)** Improvement of Non-oil Ethylene Propylene Diene Monomers Mixing Process **Nobnikan Wongsapsakul** and Parames Chutima Chulalongkorn University, Thailand

Abstract— This research aims to study the factors affecting the mixing efficiency of the case study company and to improve the non-oil EPDM mixing process by applying the Six Sigma concept. Five systematic steps are conducted to apply the Six Sigma approach, i.e., define, measure, analyze, improve and control. After applying the DMAIC steps, wastes occurred in the process are substantially reduced by shifting the Mooney viscosity mean to be near or on the target value as reflected from increased process capability index (Cpk) from -1.25 to 3.92. In addition, the result of the response surface method reveals the appropriate process parameter setting as follows: mixing time ~ 14 (min.), Nip gap ~ 1.10 (mm.) and Number of passes ~ 9 (pass.). The result also shows that the standard deviation is decreased from 0.45 to 0.30.

MS0005 (Japan time 17:45-18:00)

Value Stream Mapping-based Logistics 4.0 Readiness for Thailand Automotive-Part Manufacturers Ganda Boonsothonsatit, **Kanokwan Tonchiangsai** and Salinee Choowitsakunlert King Mongkut's University of technology Thonburi, Thailand

Abstract— The automotive industry in Thailand have competed fiercely, especially second-tier and third-tier automotive part manufacturers. They are hence impelled to apply technology 4.0 (i.e. robots, automation, and internet of thing). The technology 4.0 application is however achieved when logistics activities are leaned along their value streams. The lean logistics aims to add more values using value stream mapping (VSM). It supports to visualize a current state map of logistics activities along their value stream. The current state map facilitates to analyze the most critical problems having the highest non-value added. They are then overcome with suitable solutions whereas a future state map is drawn. In an industrial case, the most critical activities are case, disc, and cover lathing and washing; and heating respectively. They are replaced by technology 4.0 i.e. robot arms, induction machines, and conveyors in order to shorten cycle time and lead time. They lead to increase value-added ratio.



Oral Presentation Abstracts (Thursday)

Session 3 (Room ID: 765-820-7828)

Tips: The schedule for each presentation is for reference only. In order not to miss your presentation, we strongly suggest that you attend the whole session.

Morning, April 9, 2020 (Thursday) Time: 9: 30-11:30 (Japan time) Online-Meeting ID: 765-820-7828

MS0029 (Japan time 9:30-9:45)

Determination Factors in Supply Chain: Salt Problem Iffan Maflahah, Budisantoso Wirjodirdjo and Putu Dana Karningsih Sepuluh Nopember Institute of Technology, Indonesia

Abstract— The salt supply chain consists of a complex pattern. In this case, salt farmers, as a significant part of the salt trade, need careful trade channels to get optimal profits. Determination of supply chain channels on a salt commodity is not lonely affected by the price but driven by many external factors. Identify the most significant contributor to the decision making of it, and the Delphi-based approach becomes a promising way. This study designed using qualitative with two rounds of Delphi method, namely to determine the factors that influence the salt supply chain system and the second stage to establish consensus based on the factors obtained in the previous stage. Using a purposive sampling method, the subjects of the study were seven respondents from salt supply chain system. As a result, the consensus with the experts was achieved after the 3rd interview, related to factors: number of family members, income rate, salt quality, salt production, price, payment system, price information, capital, and transaction cost. Factors that influence the choice of supply chain systems will have an impact on the amount of income of farmers.



MS0053 (Japan time 9:45-10:00)

Differential Pricing of Closed-loop Supply Chain Based on Recycling Competition between Retailer and Third-party Recycler

Zou Yan and Sheng Liu Chongqing University, China

Abstract— In a closed-loop supply chain(CLSC) consisting of a manufacturer, a retailer and a third-party recycler, this work takes into account both products competition and recycling channels competition to explore the optimal pricing strategy of the CLSC. It builds the decentralized and centralized differential pricing models respectively, and the numerical examples are conducted to verify the effectiveness and practicality of the proposed models. The results show that under the decentralized decision, the sale price of new products and remanufactured products rises with the increase of product substitution coefficient; when the recycling competitive elasticity coefficient increases, the recycling prices of retailer and third-party recycler rise while the manufacturer's recycling price remains unchanged. Under centralized decision, the recycling prices of retailers and third-party recyclers are not affected by recycling competition. The results also show that the product competition coefficient has a positive impact on the supply chain profit, and the recycling competitive elasticity coefficient has a negative impact on the profit of supply chain participants but benefits customers.

MS0071 (Japan time 10:00-10:15)

Determining Sources of Uncertainty, Performance, and Strategy in Biodiesel Supply Chain **Fitri Agustina**, Iwan Vanany and Nurhadi Siswanto Institut Teknologi Sepuluh Nopember, Indonesia

Abstract- Recently, biodiesel as a biofuel has a significant role in replacing fossil fuels because of its benefits, including energy security, reducing environmental impacts (e.g., global warming and GHG emissions), and improving the economy in the rural area. However, the utilization of large-scale biodiesel industry faces many challenges, mainly uncertainties that inherent within decision making in the biodiesel supply chain. Therefore, this paper contributes by identifying several sources of uncertainty in upstream, midstream, and downstream along the biodiesel supply chain. The sources of uncertainty were investigated by using a fishbone diagram as the tool to identify the root causes in which its elements derived from the Supply Chain Operations Reference (SCOR) model. SCOR model provides several basic supply chain processes, i.e., plan, source, make, and deliver. Due to these uncertainty issues related to the biodiesel supply chain, it highlights the need to set performance measures to be achieved through the alignment of supply chain strategies. In the Indonesian context, critical uncertainty sources in the biodiesel supply chain are oil palm supply, oil palm price, land farming, CPO price, CPO supply, production, and operation, technology, policy and regulation, transportation and logistics, biodiesel price, and biodiesel demand. Key performance measures for each source of uncertainty are also determined, such as oil palm yields and oil palm quality for biomass supply uncertainty. The uncertainty management strategies discussed refer to lean strategies, but agile or hybrid strategies are also considered. Future research directions are also presented in this paper.



MS1001 (Japan time 10:15-10:30)

Supply Chain Coordination Optimization Under the Influence of Customer Strategic Behavior and Retailer Risk Preference

Sun Chenglei

West anhui university, China

Abstract— When wholesale price contracts encounter customers' strategic behaviors, they cannot coordinate the supply chain, so they introduce buyback contracts. However, in real life, people usually estimate the risks before making decisions, and so do supply chain members. Literature study has shown that retailers' risk preference will have a significant impact on their purchasing decisions, which in turn will affect retailers' inventory. Therefore, this paper mainly studies whether the use of buyback contracts can coordinate the supply chain under the influence of customer strategic behavior and retailers' risk preference. The research method is the Mean-CVaR, and this risk measurement tool can be used to describe the risk preference of retailers.

MS0051 (Japan time 10:30-10:45)

Study on Closed-Loop Supply Chain Strategy Based on Carbon Tax Policy and Reward-Penalty Mechanism Ju Gou, Sheng Liu, Dan Wu and Hongli Zhou Chongqing University, China

Abstract— Considering the environmental awareness of consumers, a Stackelberg game model is established for the closed-loop supply chain composed of manufacturer, retailer and third-party recycler. This paper analyzes three strategies of carbon tax policy (CTP), reward-penalty mechanism (RPM), carbon tax policy and reward-penalty mechanism (CTP and RPM) under decentralized decision. The results show that increasing consumers' awareness of environmental protection can improve price, demand and recovery rate of product under all three strategies. When there is a carbon tax policy, carbon emissions can be reduced. When there is a reward-penalty mechanism, it can improve the recovery rate of waste products and increase the profits of closed-loop supply chain members.

MS0056 (Japan time 10:45-11:00)

Effect of Weibull Distribution on Supplier Comparison using Lower Process Capability Index: The Examples Study

Erawin Thavorn and Prapaisri Sudas Na Ayudthya

Kasetsart University, Thailand

Abstract— This paper aims to study the effect of Weibull distribution on supplier comparison via 3 examples obtained from the simulated data and real data. The study compares two supplier using lower process capability index (C_{pl}). To understand the effect, each example is divided into 3 cases. According to Weibull distributed process, the examples show that the result of supplier comparison is sensitive to process's shape. The symmetric process produces that the p-values of supplier comparison are not different in all cases. As a result, the comparing results are the same. On the other hand, there is a possibly misleading result in case of the right-skewed process. Although the methods of handling non-normal C_{pl} are applied to compare suppliers, the p-values are different and depend on skewness and kurtosis. So, the comparing results are not the same.



MS0070 (Japan time 11:00-11:15)

Service Quality Assessment of Theme Park

Fany Astari, Fyna Astari, **Riantika Sunardi Kahfi,** Fahmi Ardi, Lovena Oki and Muhammad Mujiya Ulkhaq Diponegoro University, Indonesia

Abstract— Theme park is one of the most important assets in tourism industry. To maintain its existence, one of the most important things is by considering customer satisfaction. Since service quality is regarded vital due to its close connection with customer satisfaction, assessing it would be beneficial for service providers. The objective of this research is to assess the service quality of a theme park. The weighted SERVPERF combined with importance-performance analysis were used to accomplish the objective of the research. However, since the attributes in the SERVPERF are intended for assessing "general service", the attributes of THEMEQUAL—which was developed in theme park setting—are utilized instead. To show the applicability of the proposed method, a case study was conducted to assess the service quality of a theme park located in Jakarta, Indonesia. Result shows that the performance of the object of the research is 3.009 (of 5.000), or in the "average" state. It means that improve-ment must be made to enhance the service quality.

MS0041 (Japan time 11:15-11:30)

Mathematical Modeling and Analysis of Factors Affecting Medical Errors in Emergency Department of Government Hospitals in Province X Joshua I.L. Palisoc and **Marvin I. Norona** Mapua University

Abstract— JCI established a standard for common medical errors in hospitals known as IPSG. This study focused on the emergency departments of government hospitals A to C and a private hospital D. The objective for this study is to know and determine which among the factors must be considered in constructing an emergency department (ED), which lessens medical errors, and to be able to create a mathematical model among the factors. This research used a combination of quantitative correlational research and quasi-experimental research. The data were tested for reliability using the Attribute Agreement Analysis (3A) method in MINITAB v.17 then it proceeded to factor analysis using SPSS, which yields the result of interdependence of the factors to each presence. SEM can be performed to see the partial correlation and multi collinearity of the variables. All of the measurements used were incorporated to create a mathematical model, which aims to analyze the factors. Among the three major factors that were cited, environmental-related (ER) factors ranked the highest correlativity to medical errors or International Patient Safety Goals (IPSGs) with a value of 0.82 versus the other factors of 0.59 and 0.68. Noise and illumination were the two highest contributors of medical errors from ER factors with a value of 0.93 and 0.82, respectively.



Oral Presentation Abstracts

Session 4 (Room ID: 606-418-2387)

Tips: The schedule for each presentation is for reference only. In order not to miss your presentation, we strongly suggest that you attend the whole session.

Morning, April 9, 2020 (Thursday) Time: 9: 30-11:45 (Japan time) Online-Meeting ID: 606-418-2387

MS0049 (Japan time 9:30-9:45)

The Promotion Mechanism Development for User's Information Need Understanding Based on Knowledge Structure Precise Matching **Mingyi Yang** and Yang Xu Peking University, China

Abstract— Understanding user's information needs is the premise and basis to improve the quality of information services and systems. When engaging in various activities, people have run into problems that are followed by the realization of insufficient knowledge structure to resolve these problems, and the need for information has arisen. After their information needs are generated, they have experienced an expression process from the internal to the external and from the abstract to the concrete. The process of information need expression is influenced by the users themselves and their surrounding environment. Ambiguities will appear during this process. The current system mainly promotes understanding through (1) information extraction and knowledge acquisition, (2) ontology, semantic web, and knowledge graphs, (3) semantic disambiguation, and (4) topic modeling. This research proposes a new promotion mechanism for the understanding of user information needs. Based on collaborative filtering and folksonomy, the mechanism can precisely match the user with other most related users and get the user's knowledge structure.



2020 International conference on Industrial Engineering and Artificial Intelligence (IEAI 2020) MS0052 (Japan time 9:45-10:00) Theory and Applications of Graph Neural Networks in Knowledge Acquisition Lining Yuan, Yang Wang and Zhao Liu People's Public Security University of China, China

Abstract— Knowledge acquisition is a process in which an artificial intelligence system acquires relevant knowledge from datasets. Knowledge acquisition extracts and forms knowledge from data of different structures. One type of data used to acquire knowledge is structured data, such as physics models, chemical structures, social network information, and traffic network information. Many structured data can be represented as graph structures with dependencies and attributes. In recent years, deep learning methods are applied to knowledge acquisition tasks. As a deep connection model, graph neural network (GNN) is suitable for processing data represented as graph structure since it can use nodes and edges to realize information interaction and obtain graph dependencies. In this review, we discuss GNN model and its variants. Experiments show that the variants of GNNs outperform traditional methods in many knowledge acquisition tasks.

MS0099-A (Japan time 10:00-10:15)

Knowledge Transfer in The Preparedness Phase of Disasters: A Systematic Literature Review Ratih Dyah Kusumastuti, N. Nurmala, **A. Arviansyah** and Sigit Sulistiyo Wibowo Universitas Indonesia, Indonesia

Abstract— Knowledge management plays a vital role in humanitarian sectors. The objective of this study is to identify how knowledge is transferred toward communities and among communities during the preparedness phase through a systematic literature review (SLR). We identified 37 articles related to this unique topic. Based on the SLR, we determined that knowledge transfer toward communities could be by a one-way method, i.e., information sharing and by two-way methods, namely coordination, communication, networking, public hearing, and workshop. Knowledge transfer among communities mostly done by two-way methods such as daily communication and community sharing and planning. This result contributes to a better understanding of the role of knowledge management during the preparedness phase of the disaster.



MS5011 (Japan time 10:15-10:30)

A Model of Consumer Perception and Behavioral Intention for AI Service

Shu-Mei Wang¹, Yu-Kai Huang² and Chi – Cheng Wang³

1. National Taiwan University, Taiwan; 2. Nanhua University, Taiwan; 3. E-commerce department, Taiwan

Abstract— The success of AlphaGo makes artificial intelligence once again widely reported and concerned. At present, artificial intelligence has gone from speech recognition to natural language processing to smart voice assistants, from graphic recognition to machine vision to smart supermarkets. The application of artificial intelligence has made significant progress in many fields, and smart speakers with natural language processing as the core technology are currently attracting attention. Al application services based on natural language technology include mobile phone voice assistants, smart speakers, and humanoid robots. Although these different types of Al application services are given the important task of human-machine communication and service interface in the future Al society, the common point is that these smart speakers have the service function of dissemination. The application of Al is an important issue for the development of various types of industries in the next few years. Unfortunately, there is a lack of research in this area in the previous literature. We also build some propose management of Al service implications for physical bookstores management based on the results of model analysis.

MS0126 (Japan time 10:30-11:45)

Understanding the Model of User Adoption and Acceptance of Technology by Thai Farmers: A Conceptual Framework

Singha Chaveesuk, Wornchanok Chaiyasoonthorn and Bilal Khalid

King Mongkut's Institute of Technology Ladkrabang, Thailand

Abstract— Thailand is constantly making policy changes and implementing Industrial revolution agendas like Thailand 4.0. With the advent of Industry revolution 4.0, Thailand government is making policy initiatives and technological advancement for successful transition to industry 5.0. The initiative is focused to offer farmers an opportunities to incorporate technology in their farming and agricultural processes to produce better crops and high-quality food. The Development of Eastern Economic Corridor is a crucial step in this regard as it focused on the evolution and progression of 10 key industries in Thailand. The plan is designed to be driven through agricultural technology and innovativeness. The future benefits of the ICT based 5.0 industrial revolution in agricultural field directly depends on the user adoption and acceptance of agricultural technology. The study, therefore, investigates the acceptance and adoption of ICT based products and services by farmers by utilizing the basics of TAM. The study proposes the framework of FTAM, and identifies the internal and external factors affecting the behavior intentions and attitude of farmers. It was found out that factors like "occupation relevance", "self-efficacy" and "social influence" affect the "Perceived usefulness (PU)" and "Perceived Ease of Use (PEOU) which in return impact their behavior intention and attitude towards utilizing and accepting ICT based products and services in farming and agriculture.



MS5012 (Japan time 10:45-11:00)

Cluster Analysis of Personal Data towards Student's Graduation in Information Technology Program Wanthanee Prachuabsupakij and Somchai Chiengpongpan King Mongkut's University of Technology North Bangkok, Thailand

Abstract— This research aims to analyst and cluster the student's personal data towards student's graduation in the Information Technology program, Faculty of Industrial Technology and Management, King Mongkut's University of Technology North Bangkok, Prachin Buri Campus. The sample of this experiment consists of 544 instances and 13 attributes such as sex, province, father's occupation, mother's occupation, and student's graduation status, etc.. These samples are clustered in order to analyst the relationship between personal factors and student's graduation by partition clustering techniques. The Manhattan distance is used as a measure of the proximity or the similarity between objects. The basic idea contains five processes: (1) selecting data; (2) preprocessing data; (3) clustering data; (4) determining the optimal number of clustering; and (5) analyzing and interpreting the model. As a results, the presented method has successfully identified five clusters of students with similar characteristics in terms of personal data and student's graduation. This study will help the academic staff of IT department to get the knowledge and use it as the guidelines for public relations in recruiting new students for the next academic year.

MS0122 (Japan time 11:00-11:15)

Design of Zentangle Courses for Enhancing the Creativity of Elementary School Students Tung-Ching Chia¹, **Po-Hsiang Liu²** and Bo-Jia Huang² 1. Ling Tung University, Taiwan; 2. St. John's University, Taiwan

Abstract— Present study designed the Zentangle courses with eight teaching units involved the skills of points, lines, faces, geometrics, graphics practices and Zentangle drawing practices involved the clock creative, frame creative, three-dimensional creativity and little designer drawing at least 100 minutes once a week during eight weeks. The Chinese Version Torrance Tests of Creative Thinking applied to assess the effects of Zentangle teaching after eight weeks. Twelve elementary school students participated in this study. The paired samples t-test were compared to effects of intervention the Zentangle teaching courses for fluency, originality, abstractness of titles, elaboration and resistance to premature closure. After eight weeks of Zentangle teaching, there are significant improvement of originality, abstractness of titles and resistance to premature closure for lower grade elementary school students. Conclusion of this study as following: (1) Zentangle courses affect the performance of lower grade students' motivation; (3) Zentangle courses can reduce the stress and calm the minds of lower grade students.



MS6001 (Japan time 11:15-11:30)

Design of the Graphic-Controlled Robot for the Education of Teenagers

Ting-sheng WENG

National Chiayi University, Taiwan

Abstract— Taiwan has implemented the National Twelve-year Basic Education since 2019, and the curriculum focuses on "core literacy", in which independent action, communication and interaction, and social participation echo the educational spirit of Science, Technology, Engineering, Art, and Mathematics. Moreover, situated learning is an important topic discussed in the National Twelve-year Basic Education curriculum, which can guide students to experience, practice, deepen their thinking, and improve their vision. It is the key to link learning and application. By building knowledge and training skills in this way, learners' learning motivation and learning effectiveness can be improved. In this study, teenagers are taken as the research object, and the integrated STEAM teaching of robot and program education is constructed by combining the education method of micro: Magueen robot with a graphic control program, in order to promote the integration and innovative application of robot software and hardware, and provide teenagers with opportunities to contact with robots. The implementation results include the teaching design of program-controlled micro: Maqueen, such as the writing of the graphic control program and its ultrasonic application in micro: Maqueen. The ultrasonic application in micro: Maqueen includes the ultrasonic automatic obstacle avoidance function, ultrasonic distance measurement function, and ultrasonic following function, which aim to cultivate students' logical thinking, problem-solving ability, and other high-level thinking ability, and stimulate students' sustainable development in the field of information technology.

MS3001 (Japan time 11:30-11:45)

Promotion of the Graphic Control Program and Building Block Robot Education for Disadvantaged Students in Orphanages

Ting-sheng WENG

National Chiayi University, Taiwan

Abstract— The Ministry of Education in Taiwan attaches great importance to robotic and program education. However, when it is popularized to disadvantaged children, robot education will face many challenges involving teachers, equipment, venues, activity funds, and teaching experience. In this study, 27 children from Orphanage A in Yunlin County were taken as the target objects. The research results of developing graphic control programs are introduced into Jimu robot education to promote science popularization activities in the orphanage, in order to provide opportunities for disadvantaged children and adolescents in the orphanage to experience basic program design, learn to operate robots, and contact with alternative scientific stimulation. It can reduce the gap in the information education of students, promote equality in learning opportunities, and improve the quality of information science in orphanages.



Lunch Time 11:45-13:00



Oral Presentation Abstracts

Session 5 (Room ID: 765-820-7828)

Tips: The schedule for each presentation is for reference only. In order not to miss your presentation, we strongly suggest that you attend the whole session.

Afternoon, April 9, 2020 (Thursday) Time: 13:00-16:00 (Japan time) Online-Meeting ID: 765-820-7828

MS0012 (Japan time 13:00-13:15)

An Ergonomic Approach on Physical Assessment of Public Hospitals in the Philippines **Ma. Janice J. Gumasing**, Christine Joy R. Arreza, Christine Julia P. Guzman and Adelia Margaretha Da Costa Mapua University, Philippines

Abstract— This study focused on the occupational risks experienced by healthcare workers in public hospitals. Studies have showed that factors in the physical environment such as noise, illumination, and temperature represent a significant risk among hospital staff. Ergonomic assessment was conducted to determine the risks associated with high noise level, low illumination level, and high indoor temperature. Survey questionnaires were distributed to 276 healthcare workers to obtain the RPN (risk priority number) in the selected areas in three public hospitals in Metro Manila, Philippines. Subsequently, noise, illumination, and temperature of these hospitals were measured using sound level meter, light meter, and digital LCD electronic thermometer respectively. The RPN and physical environment measurements were statistically analyzed to determine the areas with high occupational risk. Results of the study show that noise level and temperature have strong positive relationship with the occupational risks. As the measurements of these physical environment increases, the occupational risk experienced by the healthcare workers also increases. However, illumination level and the occupational risk have a moderate to strong negative relationship with each other. It can be implied that a dimmer surrounding causes problems to healthcare workers. It was also observed that the OPD, OB ward, ER, OB nurse station, pediatrics ward, and medicine ward have high occupational risk in terms of noise level. Meanwhile for illumination, areas with high occupational risks due to poor lighting are ER, OR, laboratory, pharmacy, OPD, OB nurse station, and surgical nurse station. For this reason, the researchers were able to design an ideal physical environment for the public hospitals using the principles of ergonomics.



MS0128 (Japan time 13:15-13:30)

Effects of Chair Rise Strategies on Joint Loads

Yan-Ren Lin¹, Shu-Zon Lou² and Cheng-Lung Lee³

1. Changhua Christian Hospital, Taiwan; 2. Chung Shan Medical University, Taiwan; 3. Chaoyang University of Technology, Taiwan

Abstract— The ability to rise from a sitting position is considered as a key determinant of independence. An ergonomic analysis of sit-to-stand (STS) is needed for people to improve the daily activity, avoid the re-injury and be a reference by documenting the influences on human musculoskeletal system. The goal is to investigate the effects of arm postures and leg positions on joint motion and joint loads during sit to stand period. The twelve young college students without any musculoskeletal disorder were recruited. Three contexts of the sit-to-stand experiment were a normal sit posture with 90 degree of knee joint (N), a normal sit with feet backward 10 cm from sitting with 90 degree of knee joint (FB) and a normal sit posture with arms forward (AF). The height of the chair was adjusted with their leg length from ground to knee joint. The six-camera motion analysis capture system with two force plates were used to collect the segmental movement and ground reaction force. The movement time, kinematics and kinetics of joint were then analyzed. The results were found the range of motion of the hip, knee and ankle were significantly affected by chair raising strategies (p<0.05). FB groups had lower peak moments of the hip than N and AF groups. The largest peak knee moment occurred in FB groups. The peak knee moments among three groups are significantly different (p<0.05). The results of this research would be a reference for strategy use for older people or people who are difficult to rise from sit.

MS0079 (Japan time 13:30-13:45)

The Prevalence of Musculoskeletal Disorders among Workers in Outlets and Warehouses of Courier Service Industry

Rene Estember and Benson Que Mapua University, Philippines

Abstract— Most of the courier companies offer both courier service and cargo delivery/shipping. Thus, the courier service industry is classified under Warehousing and Support Activities for Transportation (WSAT) and Postal and Courier Activities (PCA) of the Philippine Standard Industrial Classification (PSIC). The musculoskeletal disorder (MSD) under WSAT and PCA on 2013 totals to 1075 or 56.76% of occupational diseases. The researchers aimed to conduct ergonomic assessment in the outlets and hubs of one of the largest courier companies in the Philippines. The researchers gathered information about the demographics, work methods, workplace design and working conditions of the workers through survey questionnaires, interviews and observations. The prevalence of the MSD of workers in hubs is more serious compared to those in outlets. The most affected body part of workers is lower back. Factors affecting outlet customer service representatives are the setup, table height, frequency of exercise, proper lifting, years working, weekly working days, sitting hours, postures, workplace design and transaction rates. For the workers in hubs, the significant factors that affect them are the frequency of exercise, standing time, workplace design, weekly overtime, age, transaction rates, and whether they know about proper lifting. This paper proposes an ergonomically designed workplace and recommends strategies to reduce the worker's MSD in courier service industry.



2020 International conference on Industrial Engineering and Artificial Intelligence (IEAI 2020) **MS0129 (Japan time 13:45-14:00)** Load Distribution and Lifting Duration Effects on Upper Limb Strain for Manual Handling **Cheng-Lung Lee**, Shu-Zon Lou and Yu-Ren Su Chaoyang University of Technology, Taiwan

Abstract— The effects of load distribution and lifting duration on muscular strain of upper limbs were examined in the study. Fifteen task conditions that consisted of 5 load distributions (1 balanced and 4 unbalanced patterns) and 3 lifting durations (1, 2 and 3 s/lift) were performed in the experiment. A total of 15 subjects were recruited. Electromyographic data were measured from 5 muscles of right upper limb. Hand forces were obtained at both handles, which were equipped with load cells. The results showed that the upper limb muscular strains increased when the load contribution of objects lifted was not balanced. The lifting durations had the significant effect on the biomechanical behavior of upper limbs. The risk of musculoskeletal disorders of upper limbs became higher when fast lifting was performed. The study results suggested that the center of mass should be located at the center of the load and the lifting duration should not be shorter to reduce the risk of musculoskeletal injury to the operator.

MS0077 (Japan time 14:00-14:15)

An Ergonomic Design of Passenger Cabin for Public Utility Jeepney Ma. Janice Gumasing Mapua University, Philippines

Abstract—Public Utility Jeepney (PUJ) is one of the most popular and indispensable mode of public transport, and has been providing a practical means of transportation almost everywhere in the Philippines. Recently, there has been a decline in commuter's patronage of PUJs due to the fact that the jeepneys had not received any significant innovation since its introduction in the 50s and, also the decrease of service level attributed to the worsening traffic congestion, economic, socio cultural and the rise of much more convenient alternative mode of transportation such as Asian utility vehicles, buses and railway transport have contributed to the situation.

Nowadays, it's not enough for commuters to reach their intended destinations in a cheap and quick way; there are also some other qualitative factors that can affect how passengers experience traveling. The study was conducted to improve the existing jeepney passenger cabin design using ergonomic solutions by identifying ergonomic hazards and discomfort area of the passenger while riding the jeepney cabin. The findings of the study revealed that the current jeepney passenger cabin is poorly designed or lacking proper ergonomic application. And, the passengers were likely to experience discomfort and are at risk of injury as reflected in the RULA and REBA scores of the passengers. This was also corroborated by the survey and statistical analyses that were done in the study. The existing cabin dimension do not conform and match to the anthropometric measurements of Filipino passengers and thus, they were subjected to awkward postures and movements. Because of this, the authors were able to design an ergonomic passenger cabin for public utility jeepney by applying the pinciples of anthropometry and quality function deployment.



MS0017 (Japan time 14:15-14:30)

Effects of Glovebox Glove Properties on Hand Strength **Peng-Cheng Sung**, Yung-Ping Liu and I-Lung Chen Chaoyang University of Technology, Taiwan

Abstract— Glovebox glove usage has been known to impair hand strength such as maximum voluntary grip and key pinch strength. This study assesses the effects of three material properties of glovebox glove on hand strength to offer design/selection recommendations to provide effective prevention for Musculoskeletal disorders (MSDs) in the hand and wrist during glovebox operations. Three commercially available glovebox gloves, namely butyl, hypalon, and neoprene in 0.015" and 0.03" thickness were included for evaluation. The correlation matrix indicates that the grip strength is the only dependent variable that shows statistically significant correlations with most of the independent variables except friction, and quadratic and cubic components of friction variable. Thickness and pliability are inversely correlated to the maximum grip strength. Stepwise regression shows that the interaction of thickness and pliability is the only variable included in the final equation. To minimize effects of glove usage when performing glovebox tasks involving a gripping hand, material thickness and pliability parameters could be included for glove design and selection purposes to improve worker health and safety.

MS0137 (Japan time 14:30-14:45)

Facilities Layout Design with System Simulation for Pre-Employment Services on Diagnostic Centers and Laboratories

Rene Estember and Janine Ann Bernadette Manalad Mapua University, Philippines

Abstract— This paper proposes to develop a layout model for a diagnostic clinic in Metro Manila that caters the pre-employment medical examination of applicants from different companies serviced by this diagnostic clinic. The assessment of the current diagnostic clinic focused on the current layouts within Metro Manila in coordination with the patient's perspective. The assessment was done through survey for the three diagnostic clinics for both doctors/staffs and patients using different tools and technique in facilities layout and design to come up with the best possible combination of departments that should be close together and add possible facility that help utilized and maximize space while reducing the queue. The researchers used the systematic layout planning for the design and simulation software (ProModel) to evaluate if the proposed layout design is effective. Moreover, visual representation is needed in order to appreciate the new layout design and this was done using Auto-Cad or Google Sketch-Up. This paper were able to show the design of 3 layouts that cater to a capacity and inflow of 40, 60 and 80 patients in a day.



MS0042 (Japan time 14:45-15:00)

Container Yard Planning Layout Model Considering Demand and Lost Sale Container **Budisantoso Wirjodirdjo**, Akhmad Ghiffary Budianto, I Nyoman Pujawan and Iffan Maflahah Institute Technology of Sepuluh Nopember, Indonesia

Abstract— This paper proposed a mathematical model: Mixed Integer Non-Linear Programming to optimize the utilization of space in the container yard. The model developed was considering in two types of different blocks: exclusive block and sharing block. The exclusive block is a space in the container yard uniquely serving to the certain forwarder, otherwise it is classified as sharing block type. Base on this model, the maximum revenue is gained by reducing the loss of sales opportunity and considering fulfilment number of containers demand in each block in the container yard according to the capacity available. The mathematical model was applied to LINGO 11 software to obtain the optimal solution and its results are 14 sharing blocks and 9 exclusive blocks. The Total maximum profit is \$ 29,816 per month. The proposed model was flexible enough to respond to changes in parameters related to future demand.

MS0013 (Japan time 15:00-15:15)

Work Classification and Workstation Design for Person with Functional Difficulty (PFD) **Ma. Janice J. Gumasing**, Joshua Christian Aruego and Franzeska Mae Segovia Mapua University, Philippines

Abstract — Employing Persons with Disability (PWD) is a challenge for every employer especially in the Philippines. Some companies have hesitation on hiring PWD because employers are not confident that persons with difficulty could function and deliver what they are expected from them to do in their job. In a similar way, most workplace environment is not yet designed to fit or accommodate this particular group. According to Philippine Statistics Authority (2015), Persons with Disability (PWD) has a branch called Person with Functional Difficulty (PFD); these are individuals that have difficulties in executing activities but are still capable of having a job [7]. For these reasons, it became the research interest of the authors to conduct a study on the work classification and workstation design for persons with functional difficulty (PFD). The authors examined the employment profile of 270 PWDs within NCR region and classified them according to their functional difficulty in terms of the following: (a) difficulty in seeing, even if wearing eyeglasses, (b) difficulty in hearing, even if using a hearing aid, (c) difficulty in walking or climbing steps, (d) difficulty in remembering or concentrating, (e) difficulty in self-caring (bathing or dressing) and (f) difficulty in communicating. Afterwards, specific tasks and work activities that can be performed by each person with functional difficulty were identified in order to match them with the job suitable for PFD. It was done using a career aptitude test and job analysis. Finally, principles of ergonomic were employed in order to design a workstation that would be suitable for the persons with functional difficulty based on the specific job that were identified in the study appropriate for PFD.



MS0061-A (Japan time 15:15-15:30)

The Effect of Postures on Estimating Joint Center Locations Using Depth Cameras Han-Yo Kao, Pin-Ling Liu and Chien-Chi Chang National Tsing Hua University, Taiwan

Abstract— The data of joint center locations are key elements in performing assessments of ergonomics tasks. Given that a low-cost, portable depth camera still can provide reasonable estimates of 3D data, such cameras have been used extensively in various studies. However, when using a depth camera to track the static postures that often are observed during daily activities, very few, if any, of the studies examined the accuracy of whole-body joint center locations. In this study, we used two depth cameras to investigate the effect of static postures on the accuracy of predicting the whole-body major joint center locations. In the experiment, a participant performed four static postures that occur often in daily activities, including standing, standing while bending the trunk, sitting, and sitting with the right leg over the left leg. Depth cameras and optical motion tracking system were used to track the 3D coordination of the major joint locations simultaneously. The data obtained by both systems were analyzed using Visual3D biomechanics analysis software. Thirteen whole-body major joint center locations (wrists, elbows, shoulders, neck, hips, knees, and ankles) were identified by both the depth cameras and the motion tracking system and extracted by the software. The joint center locations identified by optical motion tracking system were used to calculate the estimated error associated with the use of depth cameras. The average errors of all joint center locations were calculated and compared in each posture to examine the effect of four static postures on the accuracy of using depth cameras to identify the joint center locations. The results indicated that the average error of all joints was 3.1 cm in the standing posture and 2.8 cm in the standing while bending the trunk posture. An average error of 2.9 cm occurred in the sitting posture, while a higher error (3.7 cm) was found in the right leg over left leg sitting posture. The results indicated that the use of depth cameras to estimate the joint center locations resulted in certain errors, but the approach might still be applicable if the errors were small enough to be acceptable for certain applications.

MS0106 (Japan time 15:30-15:45)

Operational Efficiency Model for a Railway Transit in the Philippines **Rene Estember**, Hazel Bea San Pedro and John Carlo Tan Mapua University, Philippines

Abstract— This paper presents a model for a railway transit in the Philippines focusing on the operations of the whole line in order to reduce the queuing time spent by every passenger in the system. Based on the assessment of the current operations, this railway transit was unable to provide efficiency and satisfaction to the passengers due to the long queuing time experienced by them especially during peak hours. This paper assessed the factors that affect the waiting time and determine significant factors that contribute to the issue using analysis of variance (ANOVA) and Tukey's Post Hoc Test and using various industrial engineering tools such as motion and time study, forecasting, queuing analysis, and simulation to develop the model. This paper presents different simulated scenarios such as controlled volume of passengers in the platform, additional trains and cars, number of servers, schedule for skipping trains, maximizing the speed of trains, and fixed dwell time to reduce the waiting time of passengers, and to improve efficiency of the operations of the railway transit.



MS0036 (Japan time 15:45-16:00)

Workplace Design Improvement for Cable Tray Production in an Electrical Equipment Company: A Lean Perspective

Rholane Christia P. Capistrano and Marvin I. Norona

Mapua University, Philippines

Abstract— The study aimed to identify relationships between lean elements and environmental factors and their contribution to the improvement of employee performance in an electrical equipment company. Lean elements include waste volume, workspace dimension, operating time and plant layout, whereas environmental factors include light intensity, temperature level and noise level while employee performance includes labor productivity, throughput, number of accidents and workers' attendance. The study's theoretical contribution is the development of an analysis model describing the relationships between lean elements and environmental factors and the improvement of employee performance in an electrical equipment company. This study will be useful to the other electrical equipment company and business visionaries in deciding on particular design that can improve worker performance and company productivity.



Break Time 16:00-16:15



Oral Presentation Abstracts

Session 6 (Room ID: 765-820-7828)

Tips: The schedule for each presentation is for reference only. In order not to miss your presentation, we strongly suggest that you attend the whole session.

Afternoon, April 9, 2020 (Thursday) Time: 16: 15-18:45 (Japan time)

Online-Meeting ID: 765-820-7828

MS0090 (Japan time 16:15-16:30)

B2B and B2C E-commerce Platform for Mining Equipment Suppliers

Ma. Laurrette Angelica Joice Defiesta, Diana Estrada, Art Nico S. Veloso, Mel G. Llesol and Grace Lorraine Intal

Mapua University, Philippines

Abstract— E-commerce is widely used for buying and selling of products using the internet. It is the preferred way of shopping because of its convenience. This paper discusses the development of an ecommerce platform with inventory integration for a mining equipment supplier companies. Because of e-commerce's low barrier of entry, many vendors and distributors sell directly to customers. With this, there is an opportunity to automate the business processes of the mid-size mining equipment supplier company to improve the service and sales performance. In turn, it can ease the management profit of the distributor channel. The system produces an e-commerce web application that can be overall access by the administrator. Likewise, distributors and customers' accounts can be partly access through the web application. This research includes modules to improve the system such as admin module, vendor module, distributor module, customer module and IT management system.

MS0111 (Japan time 16:30-16:45)

The Transformation Path of Sports Brands in the Context of Consumption Upgrading Gang Fang and **Shan Wang** Beijing Institute of Fashion Technology, China

Abstract— With the change of the main groups and consumption preferences in the China's market, the consumption structure of China residents is transitioning to development and enjoyment. Therefore, in order to better meet consumers and improve market competitiveness, China's domestic brands are facing transformation and upgrading. This article selects four sports brands - Li Ning, Anta, Xtep and 361°- as research objects in the context of consumption upgrade. This article compares and analyzes their brand transformation measures and present management situation, and makes further recommendations about the transformation of China's sports brands.



2020 International conference on Industrial Engineering and Artificial Intelligence (IEAI 2020) **MS0131 (Japan time 16:45-17:00)** Willingness to Use Self-Service Technologies Similar to Amazon Go at Supermarkets in Thailand **Sunisa Junsawang**, Wornchanok Chaiyasoonthorn and Singha Chaveesuk King Mongkut's Institute of Technology Ladkrabang, Thailand

Abstract— Several businesses use self-service technology to help customers check-out and make payment without interacting with a cashier. Amazon also encourages this concept and uses Amazon Go technology on a customer's smartphone which automatically detects a customer profile using Artificial Intelligence. There have been very few studies conducted on self-service technology like Just Walk Out from Amazon Go in Thailand with the purpose of encouraging willingness to use. This paper focuses on a conceptual framework of self-service technology with willingness to use based on Technology Acceptance Model, Customer Satisfaction, Service Quality, Technological Innovativeness, Technology Anxiety at supermarkets in Thailand. Ultimately, this will provide profound insights into factors that influence willingness to use self-service technology at supermarkets in Thailand from the questionnaire which has tested the reliability and validity by using the Cronbach's alpha.

MS0133 (Japan time 17:00-17:15)

Influence of Generation Gap in Distinguishing Philippine Currency Coins

Janina Elyse Reyes, Princess Diane A. Balatbat, Princess Sunshine B. Borillo and Gerard Victor S. Torrefranca

Technological Institute of the Philippines, Philippines

Abstract— The preliminary study assesses the design of new coins produced by the Bangko Sentral ng Pilipinas. Two sets of coins are currently in circulation: The Bangko Sentral ng Pilipinas and the New Generation Currency Coin (NGC) Series. The researchers conducted the study to address the public confusion on the NGC coins that are being released in the circulation. The major priority of this study is to identify the influence of generation gap in distinguishing the NGC coins. The researchers conducted a time study on respondents from different age groups while identifying the values of the currency. Based on the study, the respondents rely on their visual sense more than their other senses when recognizing the newly released coins. The researchers used Ishikawa diagram to determine the factors that causes the coin confusion. Analysis of Variance and Tukey's Comparison of Means were utilized to identify which generation from the Baby-boomers to Generation Z were able to recognize the currency immediately. The researchers recommended aids on helping user easily recognize the difference between the new generation coins.



MS0040 (Japan time 17:15-17:30)

Environmental, Social, and Governance Risk in Public and Private Financial Systems: Fuzzy Cognitive Mapping Comparative Analysis

Magdalena Ziolo¹, Anna Spoz², Iwona Bak³, Katarzyna Cheba³ and Beata Zofia Filipiak¹

1. University of Szczecin, Poland; 2. The John Paul II Catholic University of Lublin, Poland; 3. West Pomeranian University of Technology, Poland;

Abstract— Environmental, social, and governance (ESG) risk is relevant for the public and private financial sectors and it has an impact on financial performance in both sectors. The aim of this study was to diagnose the impact of ESG risk on public and private financial systems and to determine the sector-specific significance of ESG risk attitudes. Fuzzy cognitive maps were used to diagnose ESG risk in the Polish public and private financial systems. Eight independent experts were asked to evaluate a total of 62 factors, of which 21 were environmental related, 25 were social related, and 16 were governance related. The results of the study revealed that the number of ESG factors and the sustainability pillar they represented differed between the financial systems. As a result, different ESG risk attitudes were observed in public and private financial systems due to the sector-specific influence. The public financial system was found to be more responsive to environmental factors, while the private sector is more likely to take into account factors representing social sustainability. These findings have practical importance and should be considered when designing ESG risk policy and management systems in public and private financial systems.

MS0045-A (Japan time 17:30-17:45)

The Impact of Ict Patents On Oecd Countries' Banks' Risk Indicators and Discussion of Robotic Communication and Smart Glasses for Banking Sector

Huseyin Cetin

Bursa Technical University, Turkey

Abstract— In that research, OECD countries' banks' risk indicators were choosen as Return on Assets, Return on Equity and Cost/Income ratio. Panel quantile regression test was implemented for the period between 2005-2013. Tau was choosen as 0.9. It was found that ICT patents had negative significant influence for OECD countries' banks' Cost/Income ratio. Moreover, Bayesian impulse response analysis was implemented for ROA, ROE, Cost/Income ratio. Positive result was found for ROA, ROE and negative result was found for Cost/Income. ICT patents positive innovation impact has more influence on ROE with respect to ROA. For I(0) and I(1), there is no unit root problem for ICT patents and Cost/Income ratio. Thus, for I(0), Johansen Fisher panel cointegration test was implemented. It was also found that there is long term relationship between ICT and Cost/Income for panel data. In that research, robotic applications and smart glasses application will also be discussed for the transformation of banking business. Robotic communication in banking sector can enhance the banking sector cost efficiency. Robotic communication with other banks and inside the bank can have important influence for the efficiency of banking sector. Robots can detect bottlenecks for increased costs. Last, biometric technology can be used for smart glasses. If that operations is effectively and safely used, banks in the future can distribute smart glasses to customers.



MS0091 (Japan time 17:45-18:00)

Modeling Regional Innovative System Performance in China Using A Dynamic Two-Stage SBM Model Tzu-Yu Lin, Wei-Hua Huang, **Hong Chen** and Sheng-Hsiung Chiu Nanfang College of Sun Yat-sen University, China

Abstract— Innovative development has always been an important policy tool for accumulating effective intelligent property to the desirability of all policy makers in China, even more so now as the trade war has seriously threatened the Chinese economy. To understand the efficacy of regional innovative policies, we proposed the dynamic two-stage slacks-based measure (SBM) model with carry-over and intermediate variables, highlighting the importance of the status of invention patent, as granted patent and patent in force, to measure the overall innovative performance for the purposed of regional innovative development, which makes significant difference to previous studies on modelling setting. Using data of 30 provincial administration regions in China for the period of 2011-2017, the average regional innovative system performance is deemed as 0.5858 and we postulated that the difference of commercialization performance among three main areas should be pay attention, because the average performance of commercialization stage in the east area is obviously better than that the west and central government who should be put more efforts on innovative competitiveness, as enhancing the quality and quantity of invention patents and the market-oriented to guild the direction for the R&D stage.

MS0043 (Japan time 18:00-18:15)

A System Dynamics for Financial Strategy Model Assessment in National Health Insurance System **Diva Kurnianingtyas**, Budi Santosa and Nurhadi Siswanto Institut Teknologi Sepuluh Nopember, Indonesia

Abstract— The National Health Insurance System (NHIS) was established by the government to provide health insurance to its people. However, some obstacles will be faced by NHIS. For example, when not having proper financial management, the fiscal budget sector will experience a deficit. The issue is happening in Indonesia. The purpose of this research is to develop and evaluate problem models so it can be used for consideration in determining relevant proposed policies. This research uses NHIS data in Indonesia from 2014 to 2018. The method used is a system dynamics approach. The validation of the SD model uses the mean comparison test and t statistic. Next, the model is tested for sensitivity under extreme conditions of low, basic, and high. Patient variables generate low and high states of 34.34% and 33.24%, respectively, which affect the variable fund inventory about 49.3 trillion and -93.46 trillion, respectively. Otherwise, participant variables affect the supply of funds in low and high conditions were about -19.60 trillion and -26.19 trillion, respectively. It can be concluded variable have a direct influence on the expense variable (patient variable) gives a more dominant effect than the variable gives the overall impact (variable of expense and income) such as participant variables. Therefore, strategies related to patient variables are used as short-term strategies, while those related to participant variables are used as long-term strategies.



MS0082 (Japan time 18:15-18:30)

Analysis of Influencing Factors of Farmers' Satisfaction with Industrial Poverty Alleviation Effect Based on Ordinal Logistic Model

Yuan Gao, Bai Xiao and Lu Lianfang

Xinjiang Vocational and Technical College of Communications, China

Abstract— Based on a sample survey of 600 farmers in the three prefectures of southern Xinjiang, China, this paper uses questionnaire survey and ordinal Logistic model to study the influencing factors of farmers' satisfaction with the effect of industrial poverty alleviation from a microscopic perspective. The research shows that the cumulative percentage of farmers' satisfaction with the effect of industrial poverty alleviation is 90.7%, and the factors that influence the evaluation of farmers' satisfaction with industrial poverty alleviation are the educational level, the amount of household labor, the annual household income, the types of roads in front of farmers' doors, household fuel, whether rural cadres help farmers to alleviate poverty and the main poverty alleviation methods of the government. Based on this, the corresponding countermeasures are put forward: to continue to improve the embodiment of precision poverty alleviation, to strengthen the intensity of industrial precision poverty alleviation, to speed up infrastructure construction, based on its own advantages, to develop characteristic industries, to realize the precision poverty alleviation of industries, and to enhance the satisfaction of farmers with industrial poverty alleviation.

MS0092 (Japan time 18:30-18:45)

Applying The Dynamic Network DEA Model to Evaluate The Chinese Regional Sustainable Performance Sheng-Hsiung Chiu, **Rui Yang**, Ziyu Xiao and Tzu-Yu Lin Nanfang College of Sun Yat-sen University, China

Abstract— The purpose of this paper is to investigate the regional sustainable development performance of 30 provinces in China from 2012 to 2017, based on a dynamic network slacks-based measure (DNSBM) approach. We construct an evaluation framework with a dynamic two-stage model with serial connection. The major difference between this paper and previous literatures is the assumption of installed capacity, defined as a carry-over linking between two consecutive terms. The empirical result of the average regional sustainable development performance is 0.3487 for 2012-2017, due to lower average performance in the electricity portfolio stage than that in the energy productivity stage. The results from the model suggests that the provincial and central government should be put more efforts in the electricity portfolio, such as raising the zero-carbon capacity, to mitigate CO_2 emission.