2019
Proceedings of International Agriculture Innovation Conference

International Association for Agricultural Sustainability

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Proceedings of International Agriculture Innovation Conference 2019

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International Association for Agricultural Sustainability
105 Cecil Street #18-39, The Octagon, Singapore 069534

Contents

General Information

■ Conference Venue

University of Oulu

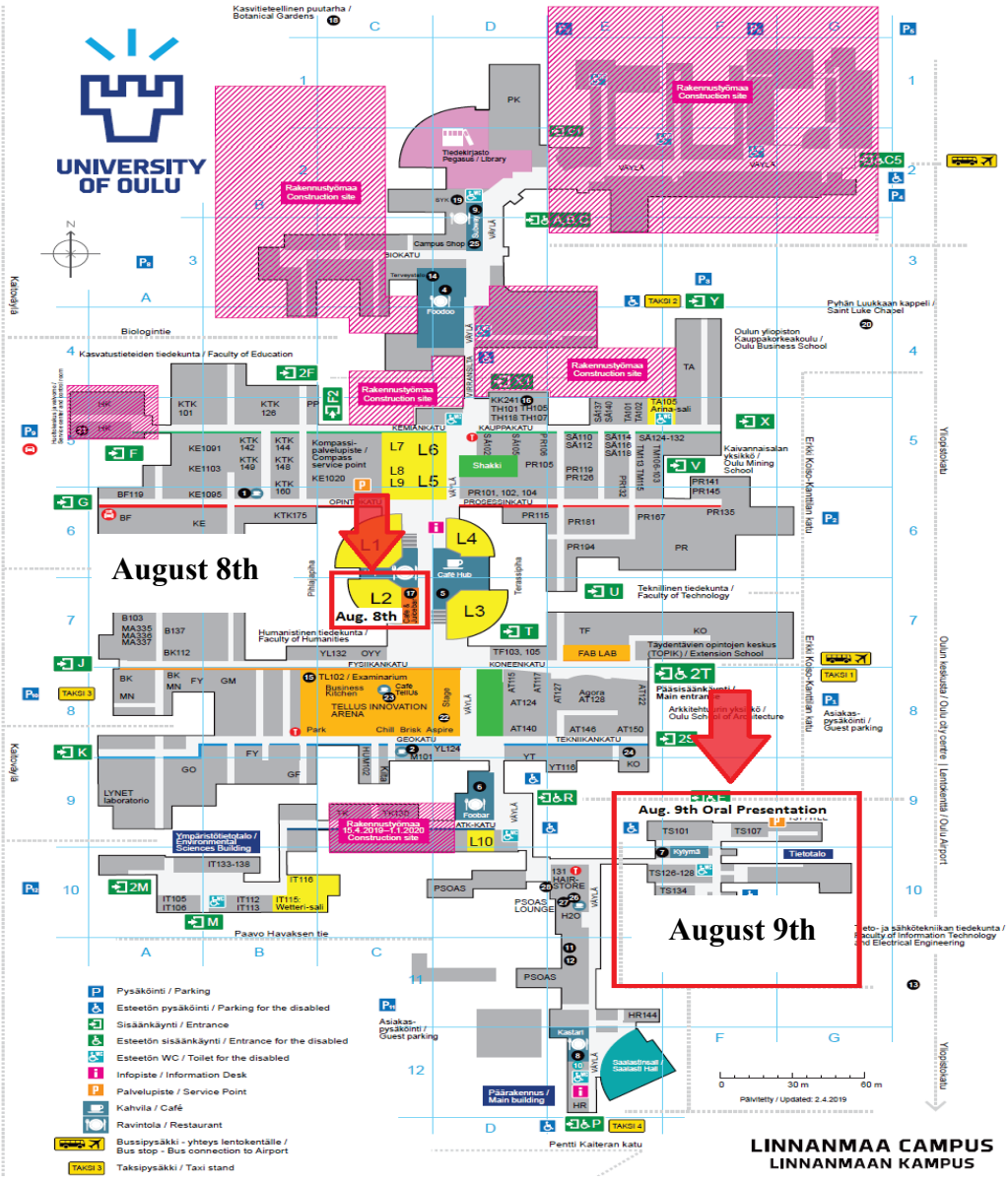
Pentti Kaiteran katu 1, 90014 Oulu, Findland

Location of Meeting Room

August 8th : First Floor, L2

August 9th: First Floor, TS101/126/127 (Same building as Faculty of Information Technology and Electrical Engineering Academic Affairs Service Point)

Floor Plan



■ Registration Desk

The registration desk will be situated at the foyer of the building at University of Oulu during the following time:

1st Floor, Building L2, 08:30-16:00 Thursday, August 8, 2019

1st Floor, TS101/126/127, 08:30-09:00 Friday August 9, 2019

■ Gala Dinner

Maikkulan Kartano

Maikkulanrinne 21, 90240 Oulu, Finland

■ Organizer

The International Association for Agricultural Sustainability (IAAS) is a non-profit organization established in January 2018. With a diversity of national and culture backgrounds, IAAS marshals a unique knowledge base of agricultural operations and practices. IAAS thus aspires to serve as an adaptive, global platform to aid international researchers and practitioners to exchange contacts, knowledge and ideas on agricultural sustainability in an effort to improve the economy, human health, and society. -- http://iaas.org.sg/

The University of Oulu was founded in 1958, As a comprehensive university located in Oulu, the northern science and technology city of Finland. The University of Oulu consists of eight faculties and many specialized research units with a total of more than 13,500 students and more than 2,800 employees. The five focus research areas of the University of Oulu are: Creating sustainability through materials and systems、Molecular and environmental basis for lifelong health、Digital solutions in sensing and interactions、Earth and near-space system and environmental change、Understanding humans in change. -- https://www.oulu.fi/university/

The Asia-Pacific Association of Agricultural Research Institutions (APAARI) was established in 1990 at the initiative of UN Food and Agriculture Organization as a unique voluntary, membership-based, self-mandated, apolitical and non-profit multi-stakeholder organization in Asia-Pacific. APAARI's main objective is to promote and strengthen agriculture and agri-food research and innovation through partnerships and collaboration, capacity development and advocacy by facilitating intra-regional, inter-institutional and

international cooperation. APAARI has been active in fostering the overall agricultural development by addressing the concerns of hunger, poverty, environmental degradation and sustainability of agricultural production. -- http://www.apaari.org/

Conference Agenda

Day 1 Wednesday, August 7th, 2019 University of Oulu Botanical Gardens		
Time	**Information**	**Location**
15:00-19:00	**Industrial Meeting (Invite-Only)**	University of Oulu Botanical Gardens

Day 2 Thursday, August 8th, 2019 University of Oulu		
Time	**Information**	**Location**
08:00-09:00	**Reception & Registration**	Foyer
Opening Ceremony		
09:00-09:20	**Opening Remarks from Organizers** **Dr. Pekka Kess** Professor, Industrial Engineering and Management, University of Oulu, Finland **Dr. Cheng-I Wei** Chairman, International Association for Agricultural Sustainability, Singapore **Dr. Matti Muhos** Director & Professor, Kerttu Saalasti Institute, University of Oulu	L2
09:20-09:30	**The Handover Ceremony of IAAS's Secretary-General**	
09:30-09:45	**Group Photography**	L2
Special Talks		
09:45-10:00	**Siriporn Boonchoo** Director General, The Queen Sirikit Department of Sericulture, Ministry of Agriculture and Cooperatives, Thailand *Topic: Strategies for Agricultural Sustainability and Thailand 4.0*	L2
10:00-10:15	**Dr. Vincent Chang** Vice Chancellor & President, Brac University, Bengal *Topic: The Bangladesh Experience*	

10:15-10:30		**Martina Spisiakova** Knowledge Management Coordinator, APAARI *Topic: The Role of Regional Bridging Institutions in the Transformation of Agricultural Innovation Systems*	
10:30-11:20		Tea Break & Networking	Foyer
Keynote Speech			
11:20-12:40	**11:20**	**Dr. Pekka Antero Kess** Professor, Industrial Engineering and Manawgement, University of Oulu, Finland *Topic: High Tech Agriculture – The Finnish Perspective*	L2
	11:40	**Dr. Hely Häggman** Professor, University of Oulu, Finland *Topic: Wild bilberry: from Basic Science to Applications*	
	12:00	**Veli-Markku Korteniemi** Founder, Aromtech Ltd., Finland *Topic: New Innovations Emerging from the Focused Scientific Research and Unique Technologies*	
	12:20	**Esko Herrala** Co-founder, Specim, Spectral Imaging Ltd., Finland *Topic: Hyperspectral Imaging in Food Quality Control*	
12:40-13:40		**Lunch**	Restaurant Napa
13:40-16:00	**13:40**	**Kateřina Ciampi Stančová** Scientific Officer, the European Commission, Joint Research Centre *Topic: Interregional Collaboration in Europe and Agri-Food Smart Specialisation Platform*	L2
	14:00	**Dr. Cheng-I Wei** Director, International Programs in Agriculture & Natural Resources, University of Maryland, USA Chairman, International Association for Agricultural Sustainability, Singapore *Topic: Innovative Agriculture for Human Health and Environmental Sustainability*	

13:40-16:00	**14:20**	**Dr. Pamela Rae Becker** Professor, Technology Management, School of Technology & Professional Services, Management , Eastern Michigan University, USA *Topic: Innovative Practices for Sustainable Agriculture in a Global Environment*	L2
	14:40	**Dr. Goran Svensson** Professor, Institute of Marketing, Kristiania University College, Norway **Dr. Carmen Padin Fabeiro** Professor, Department of Applied Economics, University of Vigo, Spain *Topic: Cleaner and Sustainable Food Production through an Aquaponics System*	
	15:00	**Dr. Joanna Paliszkiewicz** Professor, Warsaw University of Life Sciences, Poland *Topic: Leadership, Trust and Knowledge Management in Innovative Enterprises*	
	15:20	**Dr. Miranda Mirosa** Senior Lecturer, Department of Food Science, University of Otago, New Zealand *Topic: Consumers' Perceptions of Biocide Use in the Food Industry*	
	15:40	**Dr. Tian Zhu Zhang** Professor, China Agricultural University, China *Topic: Innovative Exploration of Green Development in China's Rural Area under the Background of Rural Revitalization*	
16:00-16:30		**Tea Break & Networking**	Foyer
Guest Speaker			
16:30-16:45		**Dr. Sophia, Shu Huei Lin** Manager, Data Solution Section Digital Commerce Department, Taiwan External Trade Development Council *Topic: Flourish Agriculture Industry with Digital Marketing*	L2

Keynote Speech			
16:45-17:45	**16:45**	**Dr. Kongkiti Phusavat** Professor, Department of Industrial Engineering, Kasetsart University, Thailand Visiting Professor, Department of Industrial Engineering and Management, University of Oulu, Finland *Topic: Education and Green Economy: Pedagogical Development for Underprivileged Students at Bangkok Metropolitan Administration Schools*	L2
	17:05	**Dr. Tzong-Ru (Jiun-Shen) Lee** Professor of Marketing Department, National Chung Hsing University, Taiwan Vice Chairman, International Association for Agricultural Sustainability, Singapore *Topic: The Strategies to Response to Climate Change for Agriculture Products*	
	17:25	**Dr. Tan Wee Liang** Associate Professor of Strategic Management, Singapore Management University, Singapore *Topic: Agribusiness Succession and Agricultural Sustainability*	
19:30-22:30		**Gala Dinner**	Maikkulan Kartano

Day 3 Friday, August 9th, 2019 University of Oulu		
Time	**Information**	**Location**
08:30-09:00	**Reception & Registration**	Foyer
Oral Presentation		
09:00-11:00	**Session (1)** **Agriculture Sustainability** IAIC2019-002/IAIC2019-030-1/IAIC2019-030-2/IAIC2019-103/IAIC2019-039/IAIC2019-048	TS101

09:00-11:00	**Session (2)** **<u>Agriculture Innovation</u>** IAIC2019-054/IAIC2019-004/IAIC2019-052/ IAIC2019-009/IAIC2019-089/IAIC2019-061/ IAIC2019-062	TS126
	Session (3) **<u>Agriculture Innovation & Blockchain</u>** IAIC2019-037/IAIC2019-049/IAIC2019-100 /IAIC2019-031-1/IAIC2019-031-2/IAIC2019-104/ IAIC2019-057/ IAIC2019-107	TS127
11:20-12:20	Break Time & Networking	Foyer
Field Trip		
12:00-14:30	From University of Oulu to Edible-insects Showroom at Pyhäjärvi (Lunch included)	
14:30-15:30	Edible-insects Showroom at Pyhäjärvi	
15:30-16:30	From Edible-insects Showroom at Pyhäjärvi to Berry Farm at Piippola	
16:30-18:00	Berry Farm at Piippola	
18:00-20:00	Return to Oulu	

Conference Member

Conference Honorary Chair

Cheng-I Wei

Director, International Programs in Agriculture & Natural Resources, University of Maryland, USA

Chairman, International Association for Agricultural Sustainability, Singapore

Conference Chair

Tzong-Ru (Jiun-Shen) Lee

Professor, Marketing Department, National Chung Hsing University, Taiwan

International Committee General Convener, CIBED, Taiwan

2006 Fulbright Visiting Professor, USA

Vice Chairman, International Association for Agriculture Sustainability, Singapore

Conference Lecturer, Asia-Pacific Economic Cooperation (APEC)

Chartered Fellow, The Chartered Institute of Logistics and Transport, U.K.

Editor in Chief, the IJAITG

Local Conference Chair

Pekka Antero Kess

Professor, Industrial Engineering and Management, University of Oulu, Finland

Conference Executive Director

Kuo-Chang Fu

Secretary-General, International Association for Agriculture Sustainability, Singapore

Secretary-General, Chinese Institute of Business Education Development, Taiwan

Academic Committee Chairman, National Taiwan University of EMBA Alumni Foudation, Taiwan

Executive Committee, Chinese Institute of Business Administration, China

Co-Founder, Global Chinese Marketing Federation, Singapore

Chief Operating Officer, Vital Wellspring Education, Singapore

Local Conference Executive Director
D.Sc. (Tech.) Matti Muhos
Director, the University of Oulu Kerttu Saalasti Institute, Finland
Professor, Industrial Engineering and Management, Renewing Business and Internationalisation, University of Oulu, Finland

Conference Industry Consultant
Sophia, S.H. Lin Ph. D., CEM
Manager, Data Solutions Section, Digital Commerce Department , Taiwan External Trade Development Council

Keynote Speaker

Dr. Pekka Antero Kess

Professor, Industrial Engineering and Management, University of Oulu, Finland

Pekka Kess (Dr Sc, Dr Eng) is a Professor of industrial engineering and management at the University of Oulu, Finland. He received his Dr of Science degree at the University of Oulu and Dr of Engineering at Kasetsart University.

Professor Kess has an extensive managerial experience from both universities and industrial enterprises. He has worked in managerial positions in chemical, steel and electronics industries, as well as in the software business.

He has been an active project evaluator for the European Commission, as well as a manager of international research and development projects. His research areas cover smart cities, business ecosystems, strategic management, production organisations, and knowledge management with specialisation in knowledge transfer and e-learning. New are of interest is the business opportunities based on natural forest based resources.

He has supervised more than 300 graduate and close to 30 doctoral students in the area of Industrial Engineering and Management.

Professor Kess has collaborated with Asian universities closely in the areas of research and education and services to the society.

Speech Topic: *High Tech Agriculture – The Finnish Perspective*

Dr. Hely Häggman

Professor, University of Oulu, Finland

Dr. Häggman is the Professor at the University of Oulu and Docent at University of Helsinki. Dr. Häggman completed her post-doc at Prof. Ronald Sederoff's lab which is at the Department of Forestry, Laboratory of Molecular Biology in NCSU, NC, USA. After the post-doc degree, she continued her career as a research leader of Tree Biotech project in the Finnish Forest Research Institute.

Since 2001, she has been working as a full-time Professor at the Department of Biology and now, after the change of organization, she works in the Ecology and Genetics unit. Her research is mainly focus on the species of forest trees and wild berry. Dr. Häggman has around 200 publications. She also organizes the research group which includes both post docs and PhD students.

Dr. Häggman has several commissions of trust, for example, she is the member of Research council of Academy of Finland (2007-2012), and the member of the Board of Thule Institute (UOulu 2005-2015)

Speech Topic: *Wild bilberry: from Basic Science to Applications*

Veli-Markku Korteniemi

Founder, Aromtech Ltd., Finland

Mr. Korteniemi has a background in establishing new financial instruments and consultant services for small and medium-size enterprises in Finland. He was also one of the pioneers in developing venture capital financing in Finland. Especially he has worked in Oulu region 1970-1980 when new technology companies had their start-up phases.

After ten years period as managing director in a venture capital company, he started his own businesses in 1992. One of the new areas was the establishment of Aromtech Ltd together with professor Heikki Kallio (University of Turku). Korteniemi has education in engineering from the University of Oulu, M.Sc in technical physics in 1972. Korteniemi is the Vice-President in the International Seabuckthorn Association. Aromtech's main raw material source are sea buckthorn berries.

Speech Topic: *New Innovations Emerging from the Focused Scientific Research and Unique Technologies*

Esko Herrala

Co-founder, Specim, Spectral Imaging Ltd., Finland

Esko Herrala, one of the co-founders of SPECIM, Spectral Imaging Ltd., has 30 years of experience on hyperspectral imaging and its applications. SPECIM is the world-leading provider of hyperspectral instrumentation to industry and research. As Senior Application Specialist, Esko Herrala is working closely with major food and recycling industries that apply hyperspectral imaging in their manufacturing processes.

Speech Topic: *Hyperspectral Imaging in Food Quality Control*

Kateřina Ciampi Stančová

Scientific Officer, the European Commission, Joint Research Centre

Kateřina Ciampi Stančová is Scientific Officer at the European Commission, Joint Research Centre. She is tasked with supporting the design and implementation of EU territorial development policies and assessing their impact. Her research interests include research and innovation policies and eco-systems, smart specialisation, transnational and interregional cooperation in R&I, regional development, public policies (capacity building, multi-level governance, policy learning and policy evaluation), international skilled migration and less developed innovation systems (EU-13).

Speech Topic: *Interregional Collaboration in Europe and Agri-Food Smart Specialisation Platform*

Dr. Cheng-I Wei

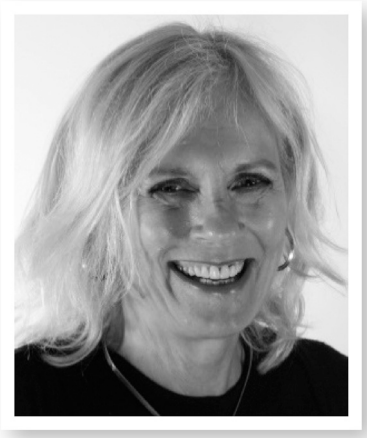
Director, International Programs in the College of Agriculture and Natural Resources, University of Maryland, USA
Chairman, International Association for Agricultural Sustainability (IAAS), Singapore

Dr. Cheng-I Wei is the former Dean of the College of Agriculture and Natural Resources and Director of the Maryland Agricultural Experiment Station and University of Maryland Extension at the University of Maryland. In January 2018, Dr. Wei founded the International Association for Agricultural Sustainability to assemble agriculture-related knowledge and methodology approaches, and to further impact the economy, human health, and sociality positively. He assumed the current position as International Programs Director in November 2015 following a two-term, 10-year service as the dean and director. Prior to coming to Maryland, Dr. Wei served as Associate Dean for Research and Graduate Studies of the College of Human Environmental Sciences at Oklahoma State University, as well as Interim Head of the Department of Nutritional Sciences. He was Bruno Professor and Head of the Department of Nutrition and Food Sciences at Auburn University, Alabama, for four years. Dr. Wei is the chairman of International Association for Agriculture Sustainability which founded in 2018. During his tenure at University of Florida, Gainesville, he advanced through the ranks from assistant professor to associate professor to full professor in the Food Science and Human Nutrition Department where he taught “Food Toxicology and Foodborne Infections” and “Seafood Technology.”

Dr. Wei received his B.S. in biology from the Tunghai University of Taiwan in 1970, an M.S. in medical microbiology from National Taiwan University in 1972, and a Ph.D. in microbiology from the University of California-Davis in 1979. His research interests are in food microbiology and safety, toxicology, and immunotoxicology. He has secured over $11 million in external funds to support his research and published 207 refereed papers.

Under his leadership, the College of Agriculture and Natural Resources has established the successful Department of Environmental Science and Technology, Center for Food Safety and Security Systems, the Agriculture Law Education Initiative, and the 2+2 Undergraduate Transfer Program with four Chinese universities. The enrollment of undergraduate students in the college increased from 916 in FY 2005 to 1226 in FY 2015, and the extramural funding increased from 19 million to 35 million.

Speech Topic: *Innovative Agriculture for Human Health and Environmental Sustainability*



Dr. Pamela Rae Becker

Professor, School of Technology & Professional Services Management, Eastern Michigan University, USA

Dr. Pamela Becker has been employed at Eastern Michigan University since 1993. She is a full professor in the School of Technology and Professional Services Management. She currently teaches within the Technology Management undergraduate program, the Technology Studies graduate program and the PhD in Technology program at EMU. Prior to this, she served as the Director of the School of Technology and Professional Services Management and the coordinator of the undergraduate Technology Management program. She was the primary researcher and developer of the Technology Management program, which was approved in 2001 and had its first program graduates in 2004.

Dr. Becker received her Associate degree from Washtenaw Community College, and a Bachelor of Science in Administration from the University of Michigan with dual majors in Managerial Economics and Finance, and Marketing. She completed this while being employed full-time at General Motors Corporation. When the General Motors Willow Run Facility closed she decided to pursue an academic career and continued studies at the graduate level. Pamela now holds a MLS in Technology degree from EMU with concentrations in Technology Management and Adult Education and in 2008 she completed the doctorate program in Educational Leadership with a cognate in Technology Management.

Her research interests include International Management of Technology, Technology Management, Workforce Development, Women in Technology, and Online Teaching.

She recently co-authored a science textbook, titled “Understanding Technology” and she received a Faculty Research Fellowship in 2016. She has numerous teaching and service awards, including Outstanding Faculty Award, 2009, Outstanding Faculty in Classroom Instruction, 2008, and Lecturers Outstanding Teaching Award, 2003.

Speech Topic: *Innovative Practices for Sustainable Agriculture in a Global Environment*

Dr. Goran Svensson

Professor, Institute of Marketing, Kristiania University College, Norway

Göran Svensson is Professor at Kristiania University College, Norway. He is also Professor at Halmstad University, Sweden. In addition, he is Visiting Professor at University of Johannesburg, South Africa; and Adjunt Professor at Monash South Africa.. He holds a Ph. D. at the School of Economics and Commercial Law, Göteborg University, Sweden.

He is the editor of European Business Review (Emerald). He is also an active and dedicated member of numerous editorial boards and editorial review boards of international research journals. Furthermore, he is a committed member of numerous international research and scholarly networks and associations.

He is a frequent author of international journal articles (240+) and international conference contributions (260+). He is also engaged as a book author.

Occasionally, he gives speeches in business and writes columns for business magazines and newspapers. During the 1980s he was an industrialist and entrepreneur in South America (Bogotá, Colombia).

His research agenda consist of various research subjects and has published in areas such as Business Ethics, Logistics Management, Industrial Marketing, Leadership, Relationship Quality, Services Marketing, Supply Chain Management, Business Sustainability.

Speech Topic: *Cleaner and Sustainable Food Production through an Aquaponics System*

Co-Author:

Dr. Carmen Padín

Professor, Department of Applied Economics, University of Vigo, Spain

Dr. Carmen Padín is the author of 6 books, 25 contributions as chapters in collective works, as well as more than 30 articles published in national and international scientific journals.

Her research areas are typologies of tourism and evaluation of tourism resources, economy of tourism, effects of tourism on the local economy, sustainability in tourism: innovation and quality, business sustainability: indicators and models.

Dr. Joanna Paliszkiewicz

Professor, Department of Economics and Organisation of Enterprises, Warsaw University of Life Sciences, Poland

Dr. Joanna Paliszkiewicz was employed as an assistant professor at the Technical University of Czestochowa, Poland after completing her master's degree in 1999. At the time, her main topic of research was intellectual capital. In 2004 she earned her PhD. Her multiple research writings were published in scholarly outlets including a book entitled "Development of organization by management of intellectual capital". In 2006 she moved from Czestochowa to Warsaw to start employment at Warsaw University of Life Sciences where she was conducting research in the area of knowledge management. In 2009 she earned her habilitation degree. As a result, she published her research in the form of articles and the book entitled "Knowledge management in small and medium enterprises – concept of estimating and models". In 2011 she was promoted to the rank of professor at Warsaw University of Life Sciences. Her research in the area of trust management began after 2009.

Dr. Paliszkiewicz was the recipient of a research project grant supported by the Polish Ministry of Sciences and Higher Education. Her research work on this grant appeared in the 2013 book "Trust in management" and other scholarly publishing outlets. She was taking part in different research projects usually as the leader. In addition to acquiring her research experience in Poland, she was a part of many scholarship endeavors in Ireland, Egypt, Slovakia, Hungary, Georgia, Serbia, USA, Taiwan. She was actively involved in participating and presenting research results at international conferences.

Currently, Dr. J. Paliszkiewicz serves as the deputy editor in chief of the international journal, Management and Production Engineering Review and editor of Issues in Information Systems. In addition, she serves as a member of editorial board of several reputable and high impact international journals such Expert System with Application and the Journal of Computer

Information Systems. Dr. Paliszkiewicz has successfully supervised Ph.D. students leading them to completion of their degrees. She has also served as an external reviewer for several Ph.D. students including a one in the University of Vaasa in Finland in 2011. She is actively involved in participating in scientific committees of many international conferences. She was chair of the scientific committee of International Farm Management Congress IFMA 19, which was held in July 2013 at Warsaw University of Life Sciences.

Speech Topic: *Leadership, Trust and Knowledge Management in Innovative Enterprises*

Dr. Miranda Mirosa

Associate Professor, Department of Food Science, University of Otago, New Zealand

Dr Mirosa is the Associate Professor in the Department of Food Science, University of Otago, New Zealand (NZ). Dr Mirosa currently holds a NZ/China Postharvest Loss and Food Waste Research Fellowship, funded by the NZ Ministry for Primary Industries.

Dr Mirosa's research focusses on food waste hotspots, aims to understand reasons for wasteful practices, and provides recommendations on minimisation. Dr Mirosa is regularly asked to provide policy advice and consultancies (and was the NZ delegate at the 2015 *APEC Food Security Workshop*, China). In 2016, Miranda was invited to join the APEC project '*Strengthening Public-Private Partnership to Reduce Food Losses*'. Her research expertise has been sought by organisations in civil society who are committed to reducing food waste (for example she sits on the Technical Working Group for the NZ National Food Waste Prevention Project). Her research profile is built on publications in the world's leading consumer food, sustainability and nutrition journals including: '*Appetite', 'J of Food Quality Preference', 'J of Nutrition and Dietetics', 'J of the Academy of Nutrition and Dietetics', 'J of Environmental Policy & Planning' and 'British Food J'*. Funding from 21 separate competitive research grants and consultancies highlights recognition of her research. In 2015, Dr Mirosa led a grant for developing NZ/China collaborations in food safety and security science. As Principle Investigator, she led a team of 13 NZ scientists from 7 different institutes to China to partake in a conference and industry visits.

Dr Mirosa serves as an Editorial Board Member for '*J of Food Ethics*' and '*Beverages*'. She is a Professional Member of the Institute of Food Science and Technology, a partner of the NZ Food Safety Research Centre, and a member of the New Zealand/China Food Safety Protection Network.

Speech Topic: *Consumers' Perceptions of Biocide Use in the Food Industry*

Dr. Tian Zhu Zhang

Professor, China Agricultural University, China

Dr. Tian Zhu Zhang is the professor at China Agricultural University, China and also the general manager at Futong Company of China Agricultural University, China. He specializes in the fields of planning and design of regional agriculture and agricultural parks, agricultural and biological engineering, facility horticultural science and engineering, new facility material and agricultural construction engineering.

Speech Topic: *Innovative Exploration of Green Development in China's Rural Area under the Background of Rural Revitalization*

Dr. Kongkiti Phusavat

Professor, Department of Industrial Engineering, Kasetsart University, Thailand
Visiting Professor, Department of Industrial Engineering and Management, University of Oulu, Finland

Dr. Kongkiti Phusavat is a Professor at Department of Industrial Engineering, Kasetsart University in Bangkok, Thailand. He is currently a Visiting Professor at Department of Industrial Engineering and Management, Oulu University in Finland. Dr. Phusavat earned his master and doctoral degrees from Department of Industrial and Systems Engineering, Virginia Polytechnic Institute and Sate University or Virginia Tech in the U.S. Dr. Phusavat attended Texas Tech University in the U.S for his undergraduate study in Industrial Engineering.

His research and work interests include productivity and performance measurement, quality improvement, management process, acquisition logistics, design process and systems engineering, pedagogical development for engineering education, and networked government. Dr. Phusavat is the author of the book with the title of "Productivity Management in an Organization: Measurement and Analysis" and has contributed the chapters to several texts in the areas of process management and improvement. Dr. Phusavat has published more than 100 referred journal articles over the past fifteen years.

He is currently the Editor in Chief of International Journal of Innovation and Learning. it is a Scopus-indexed journal and is now part of the Emerging Sources Citation Index (Clarivate Analytics). He has also worked with several leading international journals and publishers as Senior Advisor, Associate Editor, Editor, Editorial Board Member, and Reviewer. Dr. Phusavat was recognized for his 2009 Outstanding Paper Award by Emerald Group Publishing for his article published in Industrial Management & Data Systems. He again received the recognition of 2015 Emerald Literati Award- Highly Recommended Paper.

Currently, Dr. Phusavat is working with Thailand's Board of Trade in two capacities- the Chairman of Education and Skills Committee of Joint Foreign Chamber of Commerce in Thailand and a member in Thai Chamber of Commerce's Education Committee. Dr. Phusavat has been actively working in the areas of education, especially pedagogical research and development in the past five years. He served as the advisor to Bangkok Metropolitan Administration's Governor for health and human services during 2013- 2016 and was appointed to assist National Reform Council's Education Committee during 2014-15.

Since 2006, Dr. Phusavat has played a prominent role in international collaboration and partnership in education between Thailand and Finland. For his work, Dr. Phusavat was awarded the Order of the Lion of Finland with the honor title of Knight First Class in 2015. Also, in 2017, Dr. Phusavat was granted the title of Honorary Professor from Maria Curie-Skłodowska University, Poland due to his efforts on research and academic collaboration with Kasetsart University. Dr. Phusavat is an external examiner for the universities in Australia, Finland, Malaysia, and United Arab Emirates. He has helped evaluate research and project proposals from the funding agencies in Asia and Europe such as Austrian Science Fund and Thailand's National Broadcasting and Telecommunication Commission.

Speech Topic: *Education and Green Economy: Pedagogical Development for Underprivileged Students at Bangkok Metropolitan Administration Schools*

Dr. Tzong-Ru (Jiun-Shen) Lee

Professor, Department of Marketing, National Chung Hsing University, Taiwan

Dr. Tzong-Ru Lee is the Professor of Department of Marketing and the Advisor of Global Research & Industry Alliance at National Chung Hsing University. He is also the Vice Chairman of International Association for Agricultural Sustainability and the Editor in Chief of the Jorunal "IJAITG".

Dr. Lee is the former Chief of Media Relations Division and the former Chairman of the Department of Marketing, the Institute of Electronic Commerce and the Center for Electronic Commerce and Knowledge Economics Research in National Chung Hsing University. His contributions in the academia are outstanding that he has been awarded by International Biographical Center, Cambridge, England as 2000 outstanding intellectuals of the 21st century in the field of Marketing and Logistics in 2003 and 2000 outstanding intellectuals of the 21st century in 2005. He also serves as the associate editor of multiple journals, IJLEG, IJGC.

He has been invited to be the Advisory Committee Member at International Conference on Modelling Optimization and Computing(ICMOC-2012) by Department of Mechanical Engineering, Noorul Islam Center for Higher Education, Tamil Nadu, South India in 2013. His research interests are Internet Marketing and E-commerce, Service Management and Marketing, Nonprofit Marketing, Industrial Marketing, Corporate strategy, competitive dynamics, Product & Brand Management, Technology and Innovation and Supply Chain Management.

Speech Topic: *The Strategies to Response to Climate Change for Agriculture Products*

Dr. Tan Wee Liang

Associate Professor, Strategic Management, School of Business, Singapore Management University, Singapore

Secretary-General, International Association for Agricultural Sustainability (IAAS), Singapore

Dr. Tan Wee Liang joined SMU in 1999 as a member of the Core Planning Team of the then new university, SMU, when he developed the predecessor offices of the present day Office of Student Life and Office of Career Services. He joined academe beginning his career with the Faculty of Accountancy and Business Administration at the National University of Singapore in 1985. Prior to SMU, he had served as sub-dean, vice-dean and director of the Entrepreneurship Development Centre at NTU.

His current research interests lie in the domains of entrepreneurship, family business, international cooperation and corporate governance. His initial research was in law as he began his career as a law professor, when he had publications in the Malayan Law Review. He has since moved into entrepreneurship research. He has published in the Journal of International Business Studies, Entrepreneurship Theory and Practice, Family Business Review, Journal of High Technology Management Research, and Journal of Business Research. In addition to journal publications, he has co-authored Entrepreneurship and Enterprise Development in Asia (2001) and edited a number of books. He serves on the editorial boards of Journal of Small Business Management, International Entrepreneurship and Management Research, and Small Business Research.

He has served as national expert for entrepreneurship and SMEs for APEC, Asian Productivity Organization, the Colombo Plan Secretariat and the Commonwealth Secretariat.

Speech Topic: *Agribusiness Succession and Agricultural Sustainability*

Guest Speaker

Siriporn Boonchoo

Director General, The Queen Sirikit Department of Sericulture, Ministry of Agricultureand Cooperatives, Thailand

Special Talks: *Strategies for Agricultural Sustainability and Thailand 4.0*

Dr. Vincent Chang

Vice Chancellor & President, Brac University, Bengal

Prof. Vincent Chang is Vice-Chancellor and President of Brac University in Bangladesh. Previously he was founding an American style university in Oman.

He was also the executive dean of Peking University's HSBC Business School in China, a new full-English international business school; he was instrumental in building the school from scratch. His industry experiences span over engineering, energy, investment, marketing, and management consulting, with both top-Fortune multinational firms and startups in the US. Those institutions include Siemens, JP Morgan, McKinsey, ExxonMobil and the Federal Reserve. Prof. Chang holds advanced degrees from MIT (PhD Economics), Harvard (Government), Yale (Management), and Berkeley (PhD EECS). He received his bachelor degree from National Taiwan University.

Special Talks: *The Bangladesh Experience*

Martina SPISIAKOVA

Knowledge Management Coordinator, APAARI

Martina Spisiakova works as Knowledge Management Coordinator in APAARI, facilitating knowledge sharing, learning and collaboration among APAARI members and partners, as well as developing new projects and partnerships. Ms. Spisiakova is a Slovak national, with over 18-year international experience, particularly in knowledge and network management, South-South Cooperation and programme management. She is also a certified trainer, passionate about learning and capacity development in the area of food and agriculture. Before joining APAARI, Martina served organizations, such as IFAD and UNESCAP, based in Italy and Indonesia respectively. She holds Masters in Business Administration, a Bachelor degree in Social Sciences with Economics.

Special Talks: *The Role of Regional Bridging Institutions in the Transformation of Agricultural Innovation Systems*

Dr. Sophia, Shu Huei Lin
Manager, Data Solution Section Digital Commerce Department, Taiwan External Trade Development Council

Special Talks: *Flourish Agriculture Industry with Digital Marketing*

Oral Presentation Agriculture Sustainability

Friday, August 9th, 2019 09:00-11:00 TS101

IAIC2019-002

What Do Agritourism Visitors Care about Most？An Examination of the Recreation Motives in Ecological Tea Gardens

YANG Xiaoke | *Fujian Agriculture and Forestry University*

CHEN Qian | *Fujian Agriculture and Forestry University*

IAIC2019-030-1

Determinants of Value-and Business-Driven Sustainability Actions in Health Care System

Rocio Rodríguez | *Kristiania University College*

Göran Svensson | *Kristiania University College*

Nils M. Høgevold | *Kristiania University College*

David Eriksson | *Jönköping University*

IAIC2019-030-2

Macro and Micro Assessments of Future Sustainability Initiatives in Healthcare

Rocio Rodríguez | *Kristiania University College*

Göran Svensson | *Kristiania University College*

Greg Wood | *Kristiania University College*

IAIC2019-103

Food Waste Reduction in Restaurants by Monitoring and Management

Sanna Hietala | *Natural Resources Institute Finland*

Kirsi Korhonen | *Natural Resources Institute Finland*

Anna-Liisa Välimaa | *Natural Resources Institute Finland*

Toivo Muilu | *Natural Resources Institute Finland*

IAIC2019-039

Business Models for Added Value Creation of Organic Rice for Community Enterprises: Evidence from the Lower North-Eastern Region of Thailand

Suneeporn Suwanmaneepong | *King Mongkut's Institute of Technology Ladkrabang*

Sasima Fakkhong | *Phranakhon Rajabhat University*

Unggoon Wongtragoon | *University of Technology Lanna*

IAIC2019-048

Entrepreneurial Abilities of Youth as a Strength of Sparsely Populated Areas

Kyllikki Taipale-Erävala | *University of Oulu*
Leena Eskola | *University of Oulu*
Katariina Ala-Rämi | *University of Oulu*

IAIC2019-002

What Do Agritourism Visitors Care about Most？An Examination of the Recreation Motives in Ecological Tea Gardens

YANG Xiaoke[1], CHEN Qian[2]

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Abstract

Nowadays, more and more tourists go to tea gardens for recreational activities. In order to improve the recreational function of tea gardens and enhance the economic benefits that tea gardens can bring, it is important to understand the tourists' motivations for visiting. In this study, two ecological tea gardens were taken as case studies. Data from Tourists was collected by distributing a questionnaire and then analyzed using SPSS19.0. Results showed that Tourists' motivational factors were included entertainment, emotional connection, sensory experience, and health. The study showed that tourists with different characteristics differed in their motivations for visiting tea gardens which has implications for the way that these different groups are targeted and catered for.

Keywords: *Tea gardens; Recreation motive; Factor analysis*

IAIC2019-030-1

Determinants of Value- and Business-Driven Sustainability Actions in Health Care System

Rocio Rodríguez[1], Göran Svensson[2], Nils M. Høgevold[3], David Eriksson[4]

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[3] *Kristiania University College*
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Abstract

Carroll (1991, p. 42) argued that the basis for responsibility should be business-driven. In his model, businesses should, in order, be profitable, follow the law, be ethical, and be a good corporate citizen. There are examples of companies which try to construct a strategy that has high performance in all dimensions, but they still often face problems with the economic dimension (Tate and Bals, 2016). Fairphone is an interesting example of a company which has turned conventional business models on their heads, in attempting to be sustainable in all dimensions. For example, they use crowdfunding to pay for production, refuse purely economic investors and design their products for easy repair and disassembly, while also contributing to better conditions in the mining industry (Eriksson and Svensson, 2016a).

In this present research, we turn our attention to an area which has previously been overlooked in the sustainability literature. That is, the nature of the driving forces behind sustainability initiatives. When, for example, social dimensions are added to a conventional business approach, these are shoehorned into an already established system, which is barely capable of achieving the desired outcomes (Karjalainen and Moxham, 2013). As such, the research objective is to compare similarities and differences between value and business-driven sustainability initiatives. Value driven includes those organizations which are not based on the notion of maximizing profits but working toward a goal-based primary on other values. Business driven includes those organizations which focus first and foremost on profit maximization.

This study is also based on an inductive approach (Thomas, 2006). An overview of all the information gathered from the informants in the in-depth interviews was created, after collecting textual raw data. This case study was carried out in the health care industry of Spain. The organizations were all private hospitals. The selection of the health care industry is

justified by the fact that hospitals are robust organizations whose principal activity is to care for the health of patients. Sustainability is generally addressed in hospitals in order to care for the society, the economy and the environment.

The research team used judgmental sampling to select the hospitals in this industry (e.g. Fischhoff and Bar-Hillel, 1982). Hospitals were considered suitable, as they are not only bound by financial dynamics, but also invariably aim to increase the quality of life for patients. As such, their operations are intrinsically linked to several TBL dimensions.

The research team initially contacted the CEOs of four private hospitals, who put the team in contact with the person in charge of sustainability initiatives in the organizations. The responsible person turned out to be the communication director in all the studied hospitals. The empirical results, based on a content analysis of corporate artefacts and websites, revealed a set of principal areas across value- and business-driven sustainability initiatives in the studied hospitals.

The principal areas of sustainability initiatives are: (i) promotion and advertising of healthcare (e.g. conferences, training activities for young people in high school, and health programs); (ii) collaboration with NGOs and social organizations (e.g. regional blood donation center, Red Cross and Caritas): (iii) promotion of sports and culture (e.g. marathons, cycling and soccer tournaments, (iv) research and teaching (e.g. conferences and cooperative agreements with universities); (v) occupational integration of disabled people (e.g. maintaining different communication channels adapted to their needs; (vi) energy-saving measures (e.g. updating x-ray machines); (vii) greenhouse gas emissions (e.g. reduce the use of fluorinated gases); and (viii) residual control plan (e.g. control of cytostatic discharges into the sewer system).

The overall structure of the interview guide (i.e. value- or business-driven factors and related determinants) used in this study aimed at determining whether the studied private hospitals' sustainability initiatives were business- or value-driven. The sub-structure of the interview guide aimed to find out intrinsic similarities and extrinsic differences.

The empirical results revealed three main factors that helped to determine the engagement in sustainability initiatives in the studied private hospitals. We label the factors: (i) organizational, (ii) operational, and (iii) TBL priority. These factors affect the differences as well as the similarities between sustainability initiatives.

We conclude that there are at least two principal categories for profiling organizational sustainability initiatives for private health care organizations, namely whether they are value-driven or business-driven. We also conclude that there are multiple differences and

similarities between value- and business-driven sustainability initiatives, thus providing a range of research and managerial implications.

This study contributes to establishing a framework factors and their determinants for characterizing the profile of organizational sustainability initiatives. It also contributes to revealing whether organizational sustainability initiatives are value- or business-driven. Furthermore, it reveals a set of intrinsic-oriented differences between the sustainability initiatives of various organizations, as well as extrinsic-oriented similarities in the market and society.

Keywords: *Sustainability, Value-driven, Business-driven, Health care, Spain*

IAIC2019-030-2

Macro and Micro Assessments of Future Sustainability Initiatives in Healthcare

Rocio Rodríguez, Göran Svensson, Greg Wood

Kristiania University College, Norway

Abstract

Høgevold and Svensson (2016) and Høgevold *et al*. (2014) report several assessment criteria applicable to examine the organizational planning of future efforts and priorities of sustainability initiatives. This study uses their assessment criteria in the private and public sectors of the Spanish healthcare industry.

The research objective is two-fold: (i) to assess the planning of future efforts and priorities of sustainability initiatives in private and public sectors of healthcare organizations; and (ii) to compare the assessment criteria between private and public sectors, as well as between either private or public healthcare organizations.

This study aims to provide insights into private and public sectors, and healthcare organizations' planning regarding their future efforts and priorities of sustainability initiatives as well as similarities and differences between private and public sectors, and a selection of healthcare organizations.

This study takes into account the organizational consideration of macro and micro planning in private and public healthcare sectors. It applies a qualitative case study approach to assess private and public healthcare organizations' planning regarding future efforts and priorities of sustainability initiatives. We also apply the framework by Orlikowski and Yates (2002) to organize and analyze the information that we collect, which asserts that 'time' needs to be divided into phases. We focus on the direction towards future efforts and priorities of sustainability initiatives. Similarily, Halinen *et al*. (2012; p. 8) says that: "… *periods are also important within entities for classifying parts of time flow, for instance, into past, present and future…".*

On a macro level, central and local governments need to offer guidance and incentives to engage private and public hospitals in sustainability initiatives. Guidance regarding how to plan and implement sustainability initiatives would facilitate hospitals' efforts of engagement.

Incentives regarding income and tax reliefs would encourage hospitals priorities of sustainability initiatives.

To achieve homogeneity of efforts and priorities of sustainability initiatives in private and public hospitals, planning needs standardization. The standardization of planning of sustainability initiatives in private hospital requires: (i) subsidies to support efforts and priorities of sustainability initiatives; (ii) courses and training available to managers and other staff at different organizational levels; (iii) the healthcare system promote efforts and priorities of sustainability initiatives through conferences and adds; (iv) Training of medical doctors to increase their awareness of sustainability in healthcare contexts; (v) efforts and priorities of sustainability efforts included in public bids directed to private hospitals.

The standardization of sustainability initiatives in public hospitals requires: (i) benchmarking of efforts and priorities in other sectors at macro levels domestically and internationally; (ii) guidance of how implement sustainability initiatives, such as courses and training at different levels of the organization; (iii) regulation to support and accomplish pre-defined protocols; and (iv) separate budgets for efforts to prioritize sustainability initiatives at the macro level

On a micro level, hospitals need to develop a culture of sustainability initiatives that encourage and promote organizational planning of efforts and priorities among managers and other staff.

A few proposals to plan and implement sustainability initiatives for private and public hospitals are: (i) the leadership/ownership implements an economic incentive structure; (ii) training, courses and events for the employees of the hospital, some of them divided into groups (e.g. doctors, nurses and administration) and some of them targeting the whole organization; (iv) creating an organizational structure of responsibilities to manage efforts and priorities of sustainability initiatives; (v) benchmark other similar organizations' efforts and priorities of sustainability initiatives; (vi) assign a separated budget to plan and implement efforts and priorities of sustainability initiatives; (vi) Evaluate and control efforts and priorities of sustainability initiatives by trying to measure its benefits, such as image and attracting patients; and (vii) hiring a consultancy organization with expertise in the planning and implementation of sustainability initiatives.

Healthcare organizations benefit from the findings that we report by focusing on their organizational specifics to plan and implement future efforts and priorities of sustainability initiatives. Applying a copy-cat approach of planning appears to be possible, but far from adequate. On the contrary, we recommend that a healthcare organization pay attention to best practices in the industry, and others as well if relevant, but plan and implement according

their own organizational specifics and capabilities. It appears that the organizational specifics restrict the planning and implementation of efforts and priorities of sustainability initiatives.

In conclusion, this study contributes to shed light on macro- and micro-related planning of future efforts and priorities of sustainability initiatives in private and public healthcare sectors as well as across private and public healthcare organizations. It is a timely topic today, and most likely a timely topic for the future, offering multiple opportunities to contribute to existing theory and previous studies.

Keywords: *Sustainability, Time, Healthcare*

IAIC2019-103

Food Waste Reduction in Restaurants by Monitoring and Management

Sanna Hietala, Kirsi Korhonen, Anna-Liisa Välimaa, Toivo Muilu

Natural Resources Institute Finland

Abstract

The total amount of food waste generated in Finland is approximately 335-460 million kilos (excluding losses from primary production). About 35-40% of this originates in food services and retail sector (Katajajuuri et al. 2014). In mitigating greenhouse gas emissions and tackling the challenges of sustainability, food waste has been acknowledged as a 'low hanging fruit'. Food waste is seen unnecessary and burdening in all three sectors of sustainability; economic, environmental and social. Food production has been reported as one of the major sources to anthropogenic greenhouse gases and thus is playing a major role also in reducing emissions. Springmann et al. 2018 have suggested key elements in increasing food systems sustainability and point out food waste as one of the major contributors to the current intolerable state.

The importance of reducing food waste has been acknowledged in Europe and in the EU policies one of the key targets is to reduce food waste amount by 30% before 2025. Questions regarding food waste typically aren't polarizing and solutions from local scale are applicable in other local, regional and larger systems as well.

The focus of this study was to activate restaurants into monitoring and actively reducing their food waste. The amount of generated food waste was assessed in 11 restaurants which consisted of both institutional and private restaurants. Study was limited to Northern Ostrobothnia region in Finland and was conducted during 2017-2019.

Aim was to gain knowledge on the amount of food waste generated in the regions' restaurants and also to collect information on the effective measures already at use regarding reducing food waste. Goal of the study was to reduce the amount of food waste among participating restaurants by 30%.

Food waste was measured following Silvennoinen et al. (2015). Measurements were made in one week periods and each day the generated food waste was weighted. Food waste was defined as material that had been edible and it was weighted separately from non-edible biowaste, i.e. peels or napkins. Generation of food waste was observed in three measurement points; kitchen (incl. storage), serving and plate leftovers. After this first period of

measurements, the food waste reduction potential was determined for each restaurant and measures for reduction were selected together with the restaurant personnel.

Restaurants already had effective measures in use that they recommended for others. These included selling left-over food after lunch and observing storages and the amount of sold portions. The introduced measures for the second period of food waste assessment were focused on reducing either kitchen food waste, serving food waste or plate leftovers. Their impact on food waste amount was assessed by comparing the amount of food waste to the original amount.

In overall, results food waste generated in serving phase was the most significant. All restaurants had the largest contribution to food waste originating in serving. Second largest contribution varied between restaurants. With reduction treatments, schools were able to reduce their serving food waste, but also food waste from kitchen and plate leftovers. Canteens especially succeeded in reducing kitchen waste but also serving waste. Service stations were able to reduce their overall food waste, although their food waste was still higher than the original amount in other restaurants. Service stations also had longer serving period in comparison to schools or lunch canteens, which usually served lunch for two hours while service stations had their buffet open over 6 hours. Schools had one benefit over the other restaurant types. They can usually predict very well the amount of food needed for serving as their customer amount is constant. Due to this reason schools already had lowest food waste at the starting point and with reduction measures in use they could still reduce even more. Overall aim was to reduce food waste by third. Schools were able to reduce their food waste by 26%, service stations by 18% and canteens total food waste raised 1%. Canteens food waste was reduced especially from kitchen and customer leftovers, but serving waste was increased due to increased amounts.

Results indicate that by actively monitoring the amount of food waste, it is possible to find reduction potential and target effective measures to reduce food waste. It was also shown that in order to reduce total food waste, monitoring is needed in all points where food waste is generated. Further investigations are needed to estimate how selected measures impacted their target food waste and how separate restaurants performed.

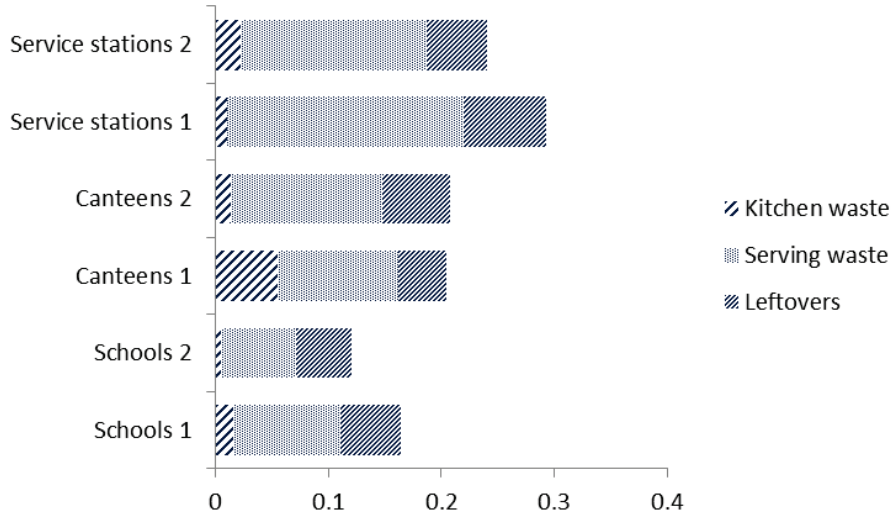

Fig. 1. Food waste in restaurants, as a share of the total produced food. First measurement period marked as 1, second (with reductions treatments) marked as 2.

Keywords: *Food waste, Sustainability, Finland, Northern Ostrobothnia Region*

IAIC2019-039

Business Models for Added Value Creation of Organic Rice for Community Enterprises: Evidence from the Lower North-Eastern Region of Thailand

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Abstract

In Thailand, rice mills play an essential role in the country's rice market structure, with rice yields of more than 80-90 percent of paddy being sent to mills. Accordingly, in order to sustainably develop rice farmers, the government supported community enterprise (CE) for rice mill operation, particularly for organic rice, in order to add value to completed organic rice products. Presently, however, the operation of several CE mill businesses faces numerous problems, causing operational failure as they should be. This study applied the SWOT analysis with a combination of the concept of business model canvas for added value creation of organic rice for farmer groups and proposed alternative business strategies for the development of CE rice mills. The case study from CEs in the lower North-Eastern Region of Thailand presented the best practice of CE organic rice mills in the country. The data collection took place from March to July 2018 by using in-depth interviews with 13 CE rice mill managers in the study area. The results revealed the analysis of the strengths, the weaknesses, the opportunities, and the threats of CE organic rice mills. Business models for added value creation of organic rice mills can be conducted in several ways throughout the three sections, downstream, midstream, and upstream, as follows: 1) for downstream section: produce organic rice certified by GAP, IFOAM, EU-NOP; 2) for midstream section: check the quality of paddy, measure moisture and impurity, and mill rice according to customers' orders; and 3) for upstream section: develop packaging, labeling and branding, and participate in marketing promotion organized by government agencies. These findings provided business models for farmer groups to understand and enhance the benefit from value-added organic rice products. Regarding relevant agencies, the result provided planning and policy information for supporting community enterprise rice mill businesses to sustainably create added value for organic rice productions.

Keywords: *Organic rice, Rice business model, Community enterprise, Rice added value creation.*

IAIC2019-048

Entrepreneurial Abilities of Youth as a Strength of Sparsely Populated Areas

Kyllikki Taipale-Erävala, Leena Eskola, Katariina Ala-Rämi

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Abstract

Sparsely populated areas are often suffering narrow economic structure, which make them woundable in front of the global processes, since their capacity to adapt to rapid economic changes in poor (Lundmark, 2006). The purpose of the study is to examine how entrepreneurial abilities, based on given entrepreneurial education, may increase entrepreneurial activity on sparsely populated areas and thus strengthen these regions economic structure.

People living in sparsely populated areas, such as small towns, and regions next to growth centres are likely to move to these growth centres and other densely populated regions, because of lack of jobs, and decreased municipal services. On the other hand, increased interest in clean nature and environment do not only attract tourists; recent studies have already demonstrated that a favourable environment and quality of life can even attract highly qualified personnel, if the appropriate structures exists such as good Internet connections and local support. After all, becoming an entrepreneur is rather common solution to earn ones living in the place one wishes to live for personal reason (Ala-Rämi 2007). Therefore, entrepreneurial education is one of the growing fields of education globally (Solomon, 2007) and considered to generate employment opportunities (Sirelkhatim and Gangi, 2015). Entrepreneurial abilities has a crucial role when searching business opportunities, and are to be seen as one starting point in entrepreneurship education (DeTienne & Chandler 2004). By studying the level of the entrepreneurial abilities of youth the societies can direct municipality actions better to utilize young people's entrepreneurial abilities as means to face and manage economic change.

The comparative, descriptive study was conducted by employing a qualitative research approach in order to give richness to the collected data and, thus, the findings. The case strategy used here allowed for an extensive examination of the phenomenon of interest. Data were collected by means of enquiry within 45 schoolgirls and schoolboys at two Finnish lower secondary schools. One of the school locate in sparsely populated area and another

school in town environment. The enquiry focused on entrepreneurial abilities such as utilization of new ideas, making decisions under uncertainty, experiment new things, innovate, and willingness to network.

The initial results show that youth at the lower secondary school in sparsely populated areas were more innovative, advanced their matters better, were more risk oriented, and have more courage to question usual manners. The youth in urban areas in turn, were more ready to network and cooperate with strange people. The findings indicate, despite of less entrepreneurial attractions in sparsely areas, the young people have better entrepreneurial abilities than corresponding young people of same age in urban environment.

The value of the study is the descriptive comparison of entrepreneurial ability approach between sparsely populated areas and urban environment. Both sparsely and densely populated areas benefit from entrepreneurial education, but in case of sparsely populated areas entrepreneurial skills of young people are even more important to keep their municipalities populated and economically active. The young people in sparsely populated areas have entrepreneurial abilities to utilize them in the future. The municipalities located in sparsely populated areas need to acknowledge these young's possibilities to increase entrepreneurship, and thus prevent migration to growth centres.

Keywords: *Entrepreneurial abilities, Youth, Sparsely populated areas, Descriptive case study, Finland*

Agriculture Innovation

Friday, August 9th, 2019 09:00-11:00 TS126

IAIC2019-054

Amelioration of Multiple Abiotic and Biotic Stresses with the Help of PGPR Including Bacillus spp. and Pseudomonas spp. through VOCs Produced by Them and Activation of Various Enzyme Activities in Plants

Urooj Rashid | *Comsats University Islamabad*

Muhammad Naeem Tahir | *Finnish Metrological Institute*

IAIC2019-004

Exploring the Characteristics of Tea Consumers in China-Based on 19,786 Samples in 10 Regions of China

Guan Xi | *Fujian Agriculture and Forestry University, College of Economics*

IAIC2019-052

The Study of Grain Importers' Transport Mode Choice Behavior

Shi-Zen SHIH | *Far Eastern Silo and Shipping Corp.*

Taih-Cherng LIRN | *National Taiwan Ocean University*

IAIC2019-009

Green Credit and Enterprise Innovation - Quasi Natural Experiment Research Based on Green Credit Guidelines

Yuan Zeming | *Tianjin University of Finance and Economics*

Ning Jinhui | *Tianjin University of Finance and Economics*

Jin Yu | *Tianjin University of Finance and Economics*

IAIC2019-089

Developing Digital Platform and Eco-system of Smart Services for Rice Cultivation

Yun-Yang Chao | *National Pingtung University of Science and Technology*

YingTzy Jou | *National Pingtung University of Science and Technology*

P.Skobelev | *Samara State Technical University*

V.Ermakov | *Samara State Technical University*

E.Simonova | *Samara State Technical University*

IAIC2019-061

Innovative Solutions for the Reuse of Pyhäsalmi Mine: New Sustainable Opportunities for Agribusiness

Katariina Ala-Rämi | *University of Oulu*
Ulla Lehtinen | *University of Oulu*

IAIC2019-062

How Sustainable Supply Chain Management Affects the Exporting of Agri-food Products?

Ulla Lehtinen | *University of Oulu*

IAIC2019-054

Amelioration of Multiple Abiotic and Biotic Stresses with the Help of PGPR Including Bacillus spp. and Pseudomonas spp. through VOCs Produced by Them and Activation of Various Enzyme Activities in Plants

Urooj Rashid[1], Muhammad Naeem Tahir [2]

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Abstract

Pathogenic diseases and abiotic stresses are source of catastrophe in agriculture in different countries. In order to deal with such devastating problems many chemical fertilizers have been commercialized that for short term provide solution for the stresses. These chemical on the other hand are expensive, toxic and dangerous for environment due to their poisonous effects on the soil, water and air. These problems are arising at major levels due to which scientist are in constant striving search for something that is cheap, eco-friendly and provides the solution to the plant against stresses without having physical contact with the plant.

Certain PGPR have the ability to augment growth of plant and ameliorate abiotic and biotic stresses. These PGPR possess some plant growth promoting traits (PGP) that include inorganic potassium solubilization, phosphate solubilization, siderophore, Indolic acetic acid (IAA) and ACC deaminase. PGPR use their specific traits to alleviate the abiotic stresses that include extreme temperature stress, drought stress, salt stress and metal toxicity. Various strains of PGPR also exhibit biological control of many major pathogens of plants through the mechanism of antibiosis, production of lytic enzyme, siderophore, cyanide and competition. Strains like *Pseudomonas fluorescens*, *Bacillus subtilis*, *Bacillus pumulis*, *Bacillus licheniformis* and *Bacillus aeruginosa* have shown antagonistic activity against multiple plant pathogens and are popular of being used to suppress these pathogenic diseases.

Bacterial volatile organic compounds are the secondary metabolites and specifically play crucial roles in the defense mechanisms by induced systemic resistance (ISR) against many stresses. It has been found to be possible for rhizobacteria to regulate plant functions without having physical contact with the surface or endodermis of root tissues. It is suggested that the presence of invisible VOC's secreted by the bacteria in rhizosphere influence the various signal transduction pathways for plant growth stimulation. Volatile organic compounds (VOCs) are secreted by PGPR that due to their low molecular weight volatilize. The efficacy of mVOCs can improve plant growth by increasing their biomass and strengthening the ISR

mechanism. The mVOCs can enhance the biomass of the respective plant by activating several signaling pathway including the involvement of various hormones including salicyclic acid, gibberellins, cytokinins and brassinosteroids. In addition to the increase in biomass they also have a direct role in increasing the chlorophyll content and photosynthetic rate.

VOCs exposed seedlings show significant enhanced growth as compared to control plants under abiotic and biotic stresses. VOC exposed seedlings enhance the plant growth by inhibiting the pathogenic infection and reduce the adverse effects of certain infection stress on plant by reducing the diseases score between 15-30 days. The studies found out that VOC's produced by PGPR strains *Paenibacillus polymyxa* Sb3-1 increase plant growth and reduce diseases progression in verticillium wilt infected oilseed rape seedlings and *Pseudomonas Fluorescens* commonly known as CHAO strain reduce disease progression in maize infected with Banded leaf and sheath Blight in an invitro experiment. Defense genes are silent in plants; when these are activated, they induce systemic resistance. Previous studies showed that early and increased activity of peroxidase, polyphenol oxidase, phenylalanine ammonia lyase lead to significant resistance against pathogenic diseases in plants.

The various antioxidant enzymes including superoxide dismutase (SOD), catalase (CAT), ascorbate peroxidase (APX), Polyphenol Oxidase Activity (PPO), Phenylalanine Ammonia Lyase Acivity (PAL) and Peroxidase Activity (POD) which acts as a first line of defense also showed a significant increase under the inoculation of PGPR to the infected plant.

Overall, *Bacillus* pumulis, *Bacillus subtilis*, *Bacillus pumulis*, *Bacillus licheniformis Bacillus aeruginosa,* and *Pseudomonas fluorescens* promotes the growth of the plant and inhibits the effects of abiotic and biotic stresses in maize plants. The rhizobacteria confers the resistance to BLSB caused by *R. solani* and drought stress in maize by producing the volatile organic compounds. These volatile organic compounds elicit the induced systemic resistance against the pathogen and abiotic stresses by activating the antioxidant enzyme activity in plants. The plants under different abiotic and biotic stresses produces better results both phenotypically and physiologically under the inoculation of PGPR as compared to the un-inoculated infected plant. However, there is a need to explore molecular mechanisms of action of VOC's of *Bacillus s*pp. to reduce the diseases incidence in plants and to take this mechanism on to the field.

Keywords: *Plant growth promoting rhizobacteria (PGPR), Plant growth promoting traits (PGP), Indole acetic acid (IAA), Volatile Organic Compounds (VOC's), Antioxidant enzymes.*

IAIC2019-004

Exploring the Characteristics of Tea Consumers in China-Based on 19,786 Samples in 10 Regions of China

Guan Xi

Fujian Agriculture and Forestry University, College of Economics

Abstract

Using an ordinal logistic model, this study examined the characteristics of Chinese tea consumers by the 19,786 samples collected by the CKB baseline survey. Significant differences were found in tea drinking frequency among Chinese tea consumers. The young were the main group that occasionally or frequently drank tea, and consumers in the east are less likely to occasionally or frequently drink tea than consumers in the west, income level and education had positive correlations with occasional and frequent tea drinking behaviors. So the factors that influenced whether consumers drank tea were different from those that influenced how much tea they consumed. The findings suggest that China's tea market should seek to target rural young men in the future; policy recommendations are also made based on the findings.

IAIC2019-052

The Study of Grain Importers' Transport Mode Choice Behavior

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Abstract

From 2006 to 2008, many shippers decide to firstly use containers to move their grain cargoes from the North America to the Far East as dry bulkers overtook container carriers in terms of per ton of ocean freight they receive. However, both the dry bulker ocean freight and bulkers' charter hire have been greatly reduced from its historical high point in 2008 to the current low freight rate. Even the unit dry bulker freight rate is currently far below the unit container ocean freight rate, the amount of dry bulker-carried grain import to Taiwan remains on around two million tons less than the same figure reported in 2002.

The main focus of this research is to find the degree of importance of 16 criteria influencing grain importers' shipping modes choice. Five semantic wordings are employed to evaluate the degree of performance of these two shipping modes on the 16 criteria respectively. The de-fuzzy technique is used to calculate the crispy numerical performance value of these two grain shipping modes.

In this study, 46 copies of questionnaires were sent and 34 of them are responded. The inconsistent index and inconsistent ratio threshold value for the AHP technique, 0.1, is used to exclude the highly inconsistent replies. Thus only 26 replies are found to be reliable to calculate the relatively degree of importance of these 16 criteria affecting grain buyers' shipping mode choice behavior.

'Purchase cost', 'selling price and cost', and 'transport costs' are in the cost aspect and are ranked as the first, third, and the fifth important criteria influencing the grain cargo stakeholders' shipping mode choice behavior. 'Variation of service quality' in the quality control aspect is ranked as the second most important criterion. Finally, the 'delivery schedule control' in the schedule control aspect is ranked as the fourth most important criterion.

A fuzzy MCDM evaluation model with semantic wordings and AHP technique is used to find the overall degree of satisfaction of grain shippers on the bulk shipping mode and the

container shipping mode. The grain importers' have higher degree of overall satisfaction on the previous shipping mode. When an individual criterion is examined, shippers have greater degree of preference on bulk shipping mode on eight of the twelve shipping mode selection criteria. Shippers perceive containers shipping mode have a better performance on only four of the twelve criteria: (1) cargo storage costs, (2) normal cargo parcel size, (3) Loss and damage during cargo handling processes, and (4) the schedule flexibility criteria. However, the overall degree of satisfaction on container shipping mode is steadily increased when comparing this researching findings with the previous research findings in 2008.

To understand the degree of importance of these twelve criteria influencing grain importers' transportation mode choice behavior, grain silo operators can forecast the quantity of grain cargoes moved through the two shipping modes, and the silo operators can use this scientific research result to negotiate a reasonable lease term with the Taiwan Port Corporation. The Port Corporation can also use this forecasting to decide the reasonable allocation of space for bulk terminals and container terminals.

Keywords: *Bulk carrier, Container carrier, Grain, AHP, Fuzzy MCDM*

IAIC2019-009

Green Credit and Enterprise Innovation - Quasi Natural Experiment Research Based on Green Credit Guidelines

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Abstract

Against the practical background of the "innovation-driven development" strategy and the "green-led transformation" practice, this paper, on the basis of the difference-in-differences model and by regarding the Green Credit Guidelines as the exogenous impact, studies the change in innovation of heavy polluting enterprises before and after the implementation of the credit policy so as to prove the implementation effects of the policy. Researches show that compared with non-heavy polluting enterprises, the implementation of the Green Credit Guidelines has produced negative net effects on the innovation of heavy polluting industries, showing that the green credit policy has the "survival of the fittest effect", and has increased the difficulty in the innovation of heavy polluting industries and accelerated the industry optimization and upgrading. In addition, this paper further finds that the "survival of the fittest effect" of the green credit policy is mainly reflected in state-owned enterprises, showing that the green credit policy brings forth higher innovation requirements for state-owned heavy polluting enterprises. This study not only enriches the literatures relevant to the factors influencing the enterprise innovation and the economic consequences of green credit, but also plays an important practical role in deepening the green credit reform and realizing the innovation-driven development strategy.

IAIC2019-089

Developing Digital Platform and Eco-system of Smart Services for Rice Cultivation

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Abstract

Rice is not only the main food in Asia but also is one of the top five foods in the world. According to United Nations statistics, the current world population has exceeded 7 billion people, and the demand for rice has also increased year by year. The Food and Agriculture Organization (FAO) of the United Nations notes that world rice consumption increased by 1.1% to 503.9 million tons in 2017/18. By 2018/19, world rice utilization will increase by another 520 tons to reach 509.1 billion tons (FAO, 2018).

But growing demand for rice can meet in near future a number of issues with production and supply because many countries in the world are currently facing a number of new challenges including global climate changes, growing demand for soil carbon sequestration, etc. It requires that agriculture need to become more smart, flexible and adaptive - to provide high quality of products, better efficiency and productivity, and finally the competitiveness and sustainability of countries development.

In this paper we present first vision of international Taiwan-Russia project on the development digital platform and eco-system of smart services for rice cultivation.

The project is oriented on new coming era of Industry 5.0 which is associated with the next step from automation of physical processes, data integration and visualization (as it is currently considered in Industry 4.0) – to Artificial Intelligence (AI) for supporting cooperation of humans and robots in managing organizations (so called “Augmented Intelligence”).

More specifically the objective of the project will be the developing of new models, methods and tools for the digitalization of domain-specific knowledge and the automation of

coordinated decision making between smart services designed as a potentially autonomous cyber-physical systems with the use of ontologies and multi-agent technology.

There are now a number of digital platforms and services on the market which are already well-developed and used in practice, but they have a number of limitations. For example, some of them are closed for end-users and developers or dictate their rules to farmers. Some other not allow users to have access to all resources in one mobile phone. Third are focused on accounting and routine automation and not provide farmers with smart services supporting knowledge-based decision making in problem situations and every day operations, etc.

In the proposed project the new concept and prototype of open digital inter-cloud AI platform and eco-system of smart services for rice cultivation will be developed.

The functionality of the platform and eco-system will help farmers:

- select varieties for planting, depending on the type and composition of the soil;
- determine the patterns of good, normal and weak rice growth;
- analyze the state of the rice, discover problems, find a solution and adjust work plans;
- make recommendations on the use of fertilizers or pesticides for rice, etc.

To solve a problem we propose to develop inter-cloud platform which will provide and combine traditional and AI services with ability to discover problem situations, find possible solutions and make negotiations between services for taking coordinated decision - collecting required data from existing platforms by specified protocols and integrating knowledge on fields and crops, machines, agro-technologies, etc.

The first prototype of digital eco-system of smart services will be focused on forming knowledge base for farm management, collecting data from sensors, hyper-spectrum analysis of images of fields, forming crop rotation plans and scheduling humans and machines with economic estimates. The digital platform will be designed as an open system - and smart services developed in one country will have chance to enter eco-system for interest of concrete farmer working in any other country.

As a first services for rice cultivations we consider the following services:

1) Knowledge Base on rice growth and physiological prediction for assessing the state of soil and plants.

At present, different rice cultivation technologies significantly affect the quality and yield of rice as well as climate events, water shortage and other factors. Agriculture must be oriented to a scientific, intelligent, and value-based approach to effectively manage and reduce costs and labor expenditures. Collect the growth parameters of the plant cultivation process, establish a digital database, and then analyze the crop growth pattern by the agricultural big

data model to effectively predict the crop production capacity. In this development rice will be treated with silicon fertilizer, and the growth, physiology, disease and microclimate data of rice development will be collected, and a database of rice growth and climate will be established to provide a reference for subsequent growth pattern analysis.

2) Smart service based on spectroscopy for rapid analysis of soil.

With the development of refined agriculture, people know that in order to maintain the fertility of the soil and improve the soil structure, the soil must have large amount of organic matter. Therefore, the demand for soil and organic material in cultivated land is increasing, but the traditional physical and chemical analysis of soil is time-consuming and tedious. To solve this problem, the research hopes to develop a method for rapid analysis of soil. The study will divide a field in Guanshan, Taitung, into three sections and assigned one agricultural cultivation treatment with different fertilizers and probiotics to each section. Different spectra of soil samples from each treatment will be collected and compared for supporting decision making processes.

Expected results for the project:

- The concept of an open digital inter-cloud platform and eco-system of smart services for rice cultivation.
- The basic ontology and knowledge base on the most advanced techniques and tools of rice cultivation for generating recommendations to farmers.
- The distributed architecture of the platform and eco-system of smart services to provide openness, flexibility and efficiency, high performance, reliability and security.
- Models, methods and tools to support collective decision-making and negotiations between agents of smart services in digital eco-system.
- Prototypes of smart services of crop cultivation to the level of each field.
- The inter-cloud integration of smart services into a digital eco-system for rice cultivating and the study of its applicability on selected farms.

In future the number of such services could be extended involving governmental organizations, universities, commercial companies, start-ups, etc

The first prototype will be focused on the domain of rice production but the main part of the platform and eco-system will be also applicable for wheat production, tropical fruits, etc.

Keywords: *Precision agriculture, Digital platform, Eco-system of smart services, Multi-agent technology, Ontology, Knowledge base.*

IAIC2019-061

Innovative Solutions for the Reuse of Pyhäsalmi Mine: New Sustainable Opportunities for Agribusiness

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Abstract

This study discusses on exploring different opportunities for innovative solutions to exploit the operational environment of Pyhäsalmi mine after mining operations end in 2019. As Pyhäsalmi mine is selected as a visiting site of the conference, the paper presents the existing operation environment and innovation projects that examines the new use of the underground mine facilities and the exploitation of geothermal energy. Pyhäsalmi mine located with good connections and infrastructure surrounded with beautiful nature in Northern Ostro-Bothnia is one of the deepest mines in Europe extending 1445 meters underground offering exceptional underground environment for non-traditional uses of nine and its surrounding lands. Worldwide the estimate for the number of abandoned mines is well over million offering a huge potential deep farming and e.g. for using geothermal energy. So far, geothermal energy is used for greenhouses, aquaculture pond and raceway heating, drying various grains, vegetables and fruit crops etc. (Lund et al. 2015).

To facilitate the re-use of Pyhäsalmi mine, a number of research, development and innovation projects are carried out during recent years. Working underground makes possible to create highly controlled environments for conducting research and with the ability to control all the parameters of testing setting. In the experimental project “Plant Production in Mine underground farm” of Natural Resources Institute of Finland makes use of production environment and technology built by the development organization in Underground Infrastructure in Pyhäsalmi Mine project. The project has identified the production and marketing of special crops with technologies that can be utilized in underground environments. The experimental production of plants aims to learn how plant production can be carried out in the mine and what kinds of plants are best suited for underground environment. The possibility to control the lighting conditions and other environmental parameters makes underground laboratories ideal places to experiment with hydroponic farming, mushroom production or storing food or beverages.(Callio, 2019). The experimental farming laboratory is situated 660 meter deep in the mine where the air temperature is stable

18-20 degree Cellius around the year. In 2017, the experimental deep farming of potatoes and nettles started. During this year, e.g. growing dying woad (Isatis tinctoria) is tested. In addition to plants, cricket farming will start in the mine during the year 2019. The underground mine provides ideal conditions for cricket farming involving heat, humidity and good amount of space, since the crickets like to spread out as they mature.

Energy mine –project, leaded by Geological Survey of Finland, examines the geoenergy potential of Pyhäsalmi mine and innovative technologies to capture the energy from deep mine as well as to investigate the commercial potential to utilize the bedrock heat of the death range 500-2500 meters. Based on the preliminary results show that the mine is a promising place for any business activities that can exploit geothermal energy collected from warm water of 20-30 degrees Celsius and the temperature can be profitable increased with a heat pump. Among renewable, low carbon energy sources, geoenergy is regarded as the most cost-effective and energy-efficient solution even in a situation where drilling has be started from the ground level. During the Energy mine -project, the investment costs of the geoenergy plant are estimated as well as the hole drilling technology from the bottom of mine is tested. A study of the potential utilizers of the energy is implemented. The use of heat in greenhouses is one of the main options highlighted. In cold winter conditions, geothermal heat would provide economic solutions for greenhouse cultivation. However, the location of the mine quite far from large cities is challenging for companies to invest in Pyhäsalmi mine. Also, the utilization of the geothermal energy of mines is still in the initial state.

End-of-life mines provide an innovative testing environment for agricultural companies. Also deep farming may be an important form of producing special plants, insects etc. in the future. Abandoned mines have endless potential in producing geothermal energy. Pyhäsalmi mine in Finland provides an environmental friendly surrounding for agribusiness and energy companies for piloting and testing new solutions and offers one of the fewest underground research facilities in the whole world.

Keywords: *Geothermal energy, Mines, Deep farming, Low carbon energy*

IAIC2019-062

How Sustainable Supply Chain Management Affects the Exporting of Agri-food Products?

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Abstract

Sustainability could be an important competitive factor when exporting agri-food products. The companies should be able to prove that their chain of operations from raw materials to distribution fulfils the requirements of sustainability. This paper first provides an overview of the sustainable issues in agri-food supply chains. Second, the sustainability labelling and quality safety standards in agri-food chains are discussed. The paper highlights whether a sustainable managed supply chain gives a competitive advantage to a small agrofood manufacturer who plans to enter to foreign markets. Finally, a case examples of exporting agri-food products to Swiss and Asian markets from Finland is presented. The results of the paper are based on a literature survey and a real-life cases collected in different developing projects carried out between years 2010-2017.

The globalization of food markets has increased the scrutiny of the origin of food, its quality, health value and the ethicality and sustainability of food production among an increasing body of consumers and other stakeholders in the food chain. For example, organic production is receiving a major boost since many consumers have lost trust in food derived from conventional production. In addition to environmental and ethical issues, the food labelling can give information about the geographical origin of the food, best known as country-of-origin effect. Sustainability labels give consumers the opportunity to take into account environmental and ethical considerations when making food choices. The consumers achieve higher utility when they consume goods produced from geographical location they preferred and vice versa, lower utility when the consume food produced from less desirable origin.

The significance of sustainably managed agrofood supply chains is already well understood by practitioners. The lack of a reasonably consistent definition may lead to confusion regarding the appropriate scope in the theory and practice of sustainable supply chain management. The results of the study shows that agrofood companies must fulfil a number of demands concerning quality standards, traceability, packages and quality labelling when

entering foreign markets. However, the study shows that small agrofood companies do not fully understand the importance of labelling when convincing foreign customers. The company needs to build and maintain a corporate reputation and reduce the impact of long distances to the markets. In addition, the traceability of product stages and origin of raw materials should be more visible to customers. If the company wants to act sustainably, it should choose environmentally and socially responsible vendors of raw materials. It is important that the claims about sustainability are clear, and not open to different interpretations. Currently there is a proliferation of labels that can confuse consumers. Public bodies should encourage clarity and transparency in food labelling.

Keywords: *Agrofood chains, Sustainability, Labelling, Country of Origin*

Agriculture Innovation & Blockchain

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IAIC2019-037

Duality Marginal Analysis on Tea Export Growth from China to ASESN Countries

Chang Lin | *Fujian Agriculture and Forestry University*

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Exploring the Innovative Application of Drones in the Case of Agricultural Production in Taiwan: Based on the Theory of Entrepreneurial Leadership

Chi-Ya Chang | *Chinese Culture University*
Chi-Yeh Lu | *National Dong Hwa University*
Yu-Ting Lo | *Shoufeng Image Company*

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Research on the Development Model of Chinese Cultural and Creative Agriculture

Xiaojuan Liu | *Shanghai University of International Business and Economics*
Zhen Li | *Shanghai University of International Business and Economics*

IAIC2019-031-1

Value Chain Analysis of Rainfed Rice Industry in Antique, Philippines

Leonie Consabo | *University of Antique-Hamtic Campus*
Ma. Olga Blanco | *University of Antique-Hamtic Campus*
Chemarie Lamprea | *University of Antique-Hamtic Campus*

IAIC2019-031-2

Production and Commercialism Practices of Two Different Rice Ecosystems in Antique, Philippines

Leonie Consabo | *University of Antique-Hamtic Campus*
Ma. Olga Blanco | *University of Antique-Hamtic Campus*
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IAIC2019-104

The Development of Hydrogel Scaffold from Silk Fibroin Protein for Biomedical Applications

Sasipim Limmanee | *The Queen Sirikit Department of Sericulture*
Jirut Meesane | *Prince of Songkla University*
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Kritchai Palintranan | *The Queen Sirikit Department of Sericulture*
Wiroje Kaewruang | *The Queen Sirikit Department of Sericulture*

IAIC2019-057

SMEs Utilizing Business Modelling to Face Economic and Societal Changes

Kyllikki Taipale-Erävala | *University of Oulu*
Mirja Väänänen | *University of Oulu*

IAIC2019-107

Study of Expression Genes involved in Proline Synthesis for Assisted Selection of Mulberry Cultivars in Water Stress

Manatsawee Suriyawanakul | *The Queen Sirikit Department of Sericulture*
Lampan Sarnchantuk | *The Queen Sirikit Department of Sericulture*
Somchai Luemunkong | *The Queen Sirikit Department of Sericulture*
Pimonrut Maythintarangson | *The Queen Sirikit Department of Sericulture*
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Pornpinee Boonbundal | *The Queen Sirikit Department of Sericulture*
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IAIC2019-037

Duality Marginal Analysis on Tea Export Growth from China to ASESN Countries

Chang Lin

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Abstract

With the proposal of "the Belt and Road Initiative", ASEAN countries situated along "the Belt and Road" resembling China in the tea drinking habits are having closer cooperation in tea trade with China. By using the tea export data under six digit HS code from UN Comtrade during 2007 to 2016, measuring the duality marginal of tea's export growth from China to ASESN countries, the paper finds that the expansion margin plays a comparatively more important role in tea export growth. The regression model is constructed based on this and analyzes empirically on the factors affecting duality marginal of tea's export growth from China to ASESN countries. The results show tea productivity and import cost of ASEAN countries have negative influence on the duality marginal, thus the policy suggestions for improving China's tea export to ASEAN countries are proposed.

Keywords: *Tea; Export growth; Duality marginal; ASESN*

IAIC2019-049

Exploring the Innovative Application of Drones in the Case of Agricultural Production in Taiwan: Based on the Theory of Entrepreneurial Leadership

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Abstract

Unmanned aerial vehicles (UAVs) (or can be termed as drones) with lightweight at reasonable costs has silently arrived as a new trend to influence businesses operations within several industries in some countries. Flying low and slow, UAVs equipped with capable sensors can deliver fine spatial resolution data at temporal resolutions defined by the end-user (Anderson & Gaston, 2013). The Massachusetts Institute of Technology categorized "agricultural drones" at the primary position among the ten breakthrough technologies (Anderson, 2014). This primacy is derived from the generally increased results of UAVs in environmental and agricultural applications. In fact, many researchers and scientists agree that agriculture as the largest user of such systems will have an essential impact (Ballesteros, Ortega, Hernández, & Moreno, 2014; Cohen et al., 2015). For instance, applying drones to monitor the use of subsidies to farmers has been conducted in the European Union (Gamulescu, Risteiu, & Popa, 2016). Surprisingly, Swiss hospitals are even implanted drones to create cost saving as well as process optimization and decrease cost pressure and even to make a technological progress (Krey, 2018).

Taiwan is known as its strongest agricultural technology in the subtropical climate zone (Council of Agriculture, Executive Yuan R.O.C., 2019). Application of light weight UAVs that can be remotely operated from the ground at reasonable costs has also become a new trend in the agricultural industry in Taiwan. For instance, the features of fast record, high maneuverability, and shooting technology with high spatial resolution image, drones can be used to generate spatial image-aid data for agricultural damage investigation, shorten the time for manpower disaster investigation, and accelerate post-disaster rehabilitation (Zhou, Wu, & Chen, 2018). However, the key question for an entrepreneur is how to deploy drones innovatively and skilfully to create economic value for his/her business.

The essence of leadership in organizations refers to the process of influencing others to understand and agree about what needs to be done and to facilitate individual and collective efforts to accomplish shared objectives (Yukl, 2013). Excellent entrepreneurs are good at identifying, assessment, and use of entrepreneurial opportunities and resources for a variety of stakeholders in order to take advantages of these opportunities and create values and it has become apparent that previous studies based on the context of larger and more established organizations could not simply be transposed into the emerging venture and small business situations (Leitch & Volery, 2017). Vecchio (2003) indicated that start-ups and small businesses are typically owner-managed and have a flat hierarchy with direct access to the owner-managers. In this context, the opportunity to interact with the top person represents a chance to receive direct, immediate approval or affirmation from an authority figure.

According to Leitch & Volery (2017), a newly emerged research field, Entrepreneurial Leadership (EL), has grown significantly since the early 1990s. Renko et al. (2015) asserted that EL can be applied to any type of organization, industry or culture and can flourish in different settings, including for-profit and not-for-profit enterprises, and the formal and informal economy. Even though EL borrowed from different theoretical streams for positioning, EL differentiates itself to the other research field by identifying specificities of the exercise of leadership in new and small, rather than large, corporations and the high-velocity environment of competition and change for all organizations encountered (Harrison et al., 2015).Although EL is still evolving and which lacks not only definitional clarity but also has not yet developed appropriate assessment to measure leaders' characteristics and behaviors, especially for assessing the leadership behaviors within the context of small business management.

Furthermore, the 'leadership role performed in entrepreneurial ventures, rather than in the more general sense of an entrepreneurial style of leadership' defines the leadership in EL (Leitch et al., 2013: 348). Obviously, the descriptions of the entrepreneurial ventures within the context of small stat-ups are more suitable to be based on the EL theories developed. This justified the reasons that the theoretical perspective of this case study is based on EL.

As a result, the core purpose of this research is to elaborate how an entrepreneur of a small start-up within the agricultural industry to apply drones innovatively for collect and integrate numerous images for generating economic value for developing his business venture. The owner strategically invited his doctoral classmate and his wife to be his partners to team up for running the business. They have devoted to imitate an e-platform for sailing agricultural products for the local individual small farmers, such as rice, pumpkins, watermelons, and some processed products. In addition, they assist them for accurately counting the number of

agricultural products, such as watermelons, banana, as well as poultry through numerous spatial image-aid data collected and integrated by drones with the assistance of AI techniques. Furthermore, they established databases to monitor and control farming diseases. Finally, they initiated more sophisticated agricultural production records for farmers dealing with the agricultural regulations required by Taiwan government. More specifically, different from the current online QRcode system, which only provides simple information such as producers' names and the origin of agricultural products, they currently constructed crop growth documentary (i.e. films) by drones to provide weekly information of watermelons' growth for consumers who are curious about their reserved products. These practices are considered to be the pioneer of agricultural innovation in Taiwan's agricultural industry.

The leadership and management behaviors of the young entrepreneur and his subordinates are described in this case based on three propositions derived from the literature review of EL. This descriptive case study can be regarded as the first EL case study conducted in Taiwan for the purpose of strengthening the existing embryonic theory developed and highlighting unanswered questions and opportunities for EL's further research.

Keywords: *Agricultural industry, Entrepreneurial leadership (EL), E-platform, Innovation, Unmanned aerial vehicles (UAVs)*

IAIC2019-100

Research on the Development Model of Chinese Cultural and Creative Agriculture

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Abstract

Cultural and creative agriculture refers to creative agriculture in a broad sense, which is a new form of agricultural development in the 21st century. It integrates scientific and technological innovation and cultural creativity with rural production, life and ecological resources, designing the forms, processes, methods and products of agricultural production and management. According to the theory of industrial integration, infiltrating, intersecting and reorganizing cultural and creative industries and agriculture will help promote agricultural innovation, enhance agricultural competitiveness, and promote the integration of local economic development. Developed countries such as the Netherlands, Japan, Germany, and the United Kingdom have realized a profound transformation of the agricultural economic development mode through the development of creative agriculture. China should draw on the experience of other countries, rely on scientific and technological creativity, cultural creativity, service creativity, ecological creativity, accelerate the promotion of industrialization, characterization, branding, integration construction, promote agricultural transformation and upgrading, and achieve high-quality and sustainable development of rural economy, culture and ecology.

Keywords: *Cultural and creative agriculture; Industrial integration; Scientific and technological creativity; Cultural creativity; Service creativity; Ecological creativity.*

IAIC2019-031-1

Value Chain Analysis of Rainfed Rice Industry in Antique, Philippines

Leonie Consabo, Ma. Olga Blanco, Chemarie Lamprea

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Abstract

Farmers in Antique were heterogeneous generally in 50 years of age. Traders obtained better educational attainment compared to farmers. Majority of the farmers adept proper cultural practices and management in rice growing as crop farming was primary source of income. However, they are mostly affected by climate change in reason of water scarcity during dry season period. Yield per hectare averaged 93.17 cavans (4.19 tons) during first cropping and 56.23 cavans (2.54 tons) during second cropping. Net income per hectare during first cropping averaged Php17,631.6 while Php17,298.6 during second cropping. The average income of traders for every cavan of palay bought was Php450.38 during first cropping and somewhat lower than second cropping at Php354.50 mainly because of the slightly lower rice was sold during this season.

Income share of farmers and traders and their value added contribution analysis was done using a cavan of palay as basis. During wet season, for every cavan of palay produced by farmers and processed and milled by traders, farmers net income amounted to Php235.63 while that traders was Php385.49. The second cropping, farmers got net income per cavan of palay of Php394.60 and traders received Php354.50 for a combined net income of Php749.10. On a per kilogram palay basis, net income of farmers during first cropping was Php0.62 while Php2.89 for traders. Traders got Php2.67 net income per cavan of palay and farmers received Php1.05 during second cropping. In terms of value added to one cavan of palay, farmers produced palay valued at Php607.27 per cavan after spending a total of Php364.45as total production cost per cavan during first cropping season. Value added by traders was Php133.31 raising to its value to Php1,196. During second cropping, farmers produced palay with a value of Php737.49 per cavan after spending Php373.35 for labor and material inputs. Traders income per cavan of palay was Php354.50 raising to its value of Php1,224.72.

Keywords: *Value chain analysis, Rainfed rice, Traders, Income share*

IAIC2019-031-2

Production and Commercialism Practices of Two Different Rice Ecosystems in Antique, Philippines

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Abstract

The study "Production and Commercialism Practices of Two Different Rice Ecosystems in Antique, Philippines" was conducted from last quarter of 2018 until the first quarter of 2019 to determine the cost and return analysis of the both irrigated and rainfed rice production ecosystem, socio-economic profile of the rice farmers, describe farm characteristics and marketing practices, determine the cost and return of rice production and find out the problems of the farmers related to rice production and marketing.

There were 58.50% were owner-operators and 41.50% were tenants or simply renting with an average age of 52.70 years old with at least better educational attainment. Rice crop farming was considered as their primary source of livelihood in both rice ecosystems with an average rice farm of 1.48 hectares in irrigated areas while 1.04 hectares in rainfed situation.

Rice production per hectare varies in whole area posted an average irrigated rice production per hectare during first cropping at 4.15 tons per hectare compared to 2.81 tons per hectare in rainfed areas. Net income during first cropping in irrigated farms was Php114,092.3 with an return of investment of 17.72% while Php46,970.45 to rainfed farms with 21.08%. During second cropping, average rice production in irrigated areas was 2.97 tons per hectare while 1.23 tons per hectare revealed in rainfed domain. Net income shows lower compared to previous cropping at Php97,286.81 in irrigated farms with return of investment of 14.82% while rainfed disclosed at Php25,342.91 at 15.24% . Rice farmers in Antique, Philippines were mostly affected by natural calamities such water scarcity at 94.50% during dry season as totally revealed during third cropping of both irrigated and rainfed farms that leads to lower production rate. Biotic factors such as occurrence of pests and diseases was also determine at 94% in both rice ecosystems for entire cropping seasons.

Keywords: *Rice ecosystems, Return of investment, Marketing, Irrigated*

IAIC2019-104

The Development of Hydrogel Scaffold from Silk Fibroin Protein for Biomedical Applications

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Abstract

The objective of this research was to develop the scaffold from silk fibroin for bone tissue engineering. This research was conducted at the Faculty of Dentistry, Prince of Songkla University and the Queen Sirikit Department of Sericulture in 2017-2018. Fibroin was extracted from Thai silk cocoons (NangLai). Silk fibroin/poly (vinyl alcohol) blend hydrogels were fabricated via freeze-thawing method at various ratios of silk fibroin to PVA: 100:0 (SF100), 70:30 (SF70), 50:50 (SF50), 30:70 (SF30) and 100:0 (PVA). The physical properties of hydrogels were evaluated, such as morphology pore size, swelling and degradation. Biological properties of hydrogels were assessed using osteoblast-like cells (MC3T3-E1) culture. The results revealed that all of Thai silk fibroin/PVA blend hydrogels had three-dimensional porous structures. The average pore size of the hydrogels was in the range of 68.04±8.7 to 100±10 μm. The addition of PVA to hydrogels lowered the percentage of swelling but increased percentage of degradation. The results of the biological properties evaluation showed that the blending of silk fibroin with PVA could promote cell adhesion and proliferation on the hydrogel scaffolds. Silk fibroin/poly (vinyl alcohol) blend hydrogels, 70:30 ratios could support osteoblast cells growth, proliferation and adhesion. Moreover, this hydrogels enhanced the alkaline phosphatase activity and calcium deposition from cells, which indicated the bone formation. From all above results, it is suggested that silk

fibroin/poly (vinyl alcohol) blend hydrogels derived from Thai silk had good physical and biological properties for bone formation. Therefore, these hydrogel scaffolds had a potential to be applied in bone tissue engineering.

Keywords: *Scaffold, Hydrogel, Fibroin, Poly (vinyl alcohol)*

IAIC2019-057

SMEs Utilizing Business Modelling to Face Economic and Societal Changes

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Abstract

Sparsely populated areas are facing many economic and societal trends more intensively than large city areas. For example, people ageing is causing companies severe challenges in gaining enough proper workforce in order to serve various customer groups. Business model generation canvas (Osterwalden & Pigneur) can be used to analyze, develop and communicate the strengths in the company's business model to evaluate business opportunities in changed situations. On the other hand, business model environment analysis tool can be used for analyzing a business model in certain business environment and in its economic and societal settings.

This paper presents a case study from seven SME's operating in agricultural-related business in Oulu South Region in Finland. Case studies focus on company management's viewpoint on company's strengths, weaknesses, opportunities and threats. Internal strengths and weaknesses are compared to business model generation canvas and external opportunities and threats are presented based on business model environment analysis tool. The paper discusses on economic and societal trends the companies have considered, and potential trends that have not been well-though-out by the management in changed situation. For practitioners, the paper suggests directions how to turn current economic and societal changes into strengths in company's business model, as well as how to exploit the opportunities and avoid the threats.

Keywords: *Business model, Business model generation canvas, Business model environment, Sparsely populated areas*

IAIC2019-107

Study of Expression Genes involved in Proline Synthesis for Assisted Selection of Mulberry Cultivars in Water Stress

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Abstract

Mulberry cultivation in rainfed area, one important thing must be concerned was using drought tolerant mulberry variety. The aim of this research was to investigate the proline content as gene expression under the water deficient plants and to develop the molecular marker for selection gene expression. The experiment was conducted in the field trial by using 10 varieties of mulberry plants. These were categorized into 2 group as high and low proline contents and planted in three level of drought stress as 0, 3 and 6 days. The real time PCR was used to investigate the expression level of *P5CS* and *P5CR* which invole in proline biosynthesis. Moreover, 10 mulberry varieties were screen for drought tolerant and drought susceptible using 30 SRAP marker. The result revealed that there were 4 pairs of primers comprising ME1xEM1 ME2xEM4 ME3xEM4 and ME5xEM6 can distinguish between drought tolerant and susceptible varieties. This molecular marker can be used to select tolerant mulberry varieties in the future.

Keywords: *Mulberry, Proline, Genes expression, Water stress*

Paper Presentation

IAIC2019-120

Exploring the Factors Affect Business Owners' Choice of Endorsement

Tzong-Ru Lee | *National Chung Hsing University*
Yu-Hsuan Kuo | *National Chung Hsing University*
Radim Jiroušek | *Czech Academy of Sciences*
Kuo-Chang Fu | *Singapore Management University*

IAIC2019-121

Use Agriculture Purchasing Managers' Index to Provide Investment Suggestion for Agricultural Business: The Case Study of Taiwanese Rice industry

Tzong-Ru Lee | *National Chung Hsing University*
Yi-Ting Tseng | *National Chung Hsing University*
Radim Jiroušek | *Czech Academy of Sciences*

IAIC2019-122

Research on the Factors of Designing the Blockchain Entrepreneurial Service Platform

Tzong-Ru Lee | *National Chung Hsing University*
Huei-Jyun Chen | *National Chung Hsing University*
Kuo-Chang Fu | *Singapore Management University*
Václav Kratochvíl | *Czech Academy of Sciences*

IAIC2019-123

The Application of Python to Processed Pineapple Product

Tzong Ru-Lee | *National Chung Hsing University*
Wei Shen | *National Chung Hsing University*
Kuo-Chang Fu | *Singapore Management University*
Václav Kratochvíl | *Czech Academy of Sciences*

IAIC2019-124

To Develop Strategies for Plant Factory

Tzong-Ru Lee | *National Chung Hsing University*
Yu-Chun Chen | *National Chung Hsing University*
Lucie Vachova | *University of Economics, Prague*

This paper will not be oral presented by the auther during the conference

IAIC2019-120

Exploring the Factors Affect Business Owners' Choice of Endorsement

Tzong-Ru Lee[1], Yu-Hsuan Kuo[1], Radim Jiroušek[2], Kuo-Chang Fu[3]

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Abstract

With the rise of Internet Celebrity Economy, the recommendations of the community influencers on the social platform gradually replace the traditional ways to do online business.

Celebrity endorsements become the new darling of the business owners. However, the interaction between the community influencers and the companies is still vague. Hence, we want to fill the gap. Through the literature, the business owners can choose the factors of the community influencers and divide these influencing factors into four parts according to different facets. “Community Influencer Orientation,” “Product Design Orientation - Film,” “Product Design Orientation - Article,” "Product design oriented - Platform," extending the four major aspects to the detailed factors and dividing all the influencing factors into four layers, totally 54 factors. When the community influencers want to understand the demand of the business owners for product endorsement, can take this result as a reference.

Keywords: *Endoresement, Online community, Influencing Factors*

IAIC2019-121

Use Agriculture Purchasing Managers' Index to Provide Investment Suggestion for Agricultural Business: The Case Study of Taiwanese Rice industry

Tzong-Ru Lee[1], Yi-Ting Tseng[1], Radim Jiroušek[2]

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[2] *Czech Academy of Sciences, Institute of Information Theory and Automation*

Abstract

Based on the contents proposed from key paper "The Trial Compilation of Agriculture Purchasing Manager's Index for Taiwan: The case of Taiwanese Hog industry (Tien, 2018)." Which introduced the background of Purchasing Managers' Index (PMI), importance of Agriculture Purchasing Managers' Index (APMI), and the methodology with database. Therefore, the purpose of this research is to use the feasible rice results of APMI, and then, illustrate the results with business investment suggestion. Rice was a crop that developed very early in Taiwan and it had approximately hundred-year history. Since Taiwanese rice industry was affected by imported rice and changed of eating habits that impacted production structure and consumption (2013, Tsai). Hence, the government implemented industrial policy revolution that made Taiwan rice industry turned high quantity into high quality. According to the statistical data from Council of Agriculture showed that rice's arable land area only accounted for 21 percent of total arable land area in 2016, but the quantity was the highest in crop. Which means, rice industry is the high-value agricultural business in Taiwan. We collected six rice variables from the governmental website, including productivity, price of paddy, planted area, the actual stock of rice and paddy, quantity of exports and quantity of imports. Followed the research methods, included conduct rice data sets of principal component analysis, calculate the contributions of variables with eigenvalue and APMI of each data set, and found the highest correlation coefficient between APMI and revenue. Findings of this research had already found one data set is able to interpret 0.939, which rice industry of APMI had highly correlated with revenue. The result indicated that the second growing season of rice industry was suitable period to invest. The second growing season covered August, September, October, November and December.

Keywords: *PMI, Rice, APMI, Open data*

IAIC2019-122

Research on the Factors of Designing the Blockchain Entrepreneurial Service Platform

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Abstract

Entrepreneurs and investors often face information asymmetry in the process of raising capital and investment, which affects the capital flows between the two sides. Therefore, the main purpose of this study is to explore the investment evaluation criteria applied to the blockchain entrepreneurial service platform. The investment evaluation criteria can be used as an important information for investors to make investment decisions. With blockchain technology, we can ensure the authenticity of the information on this platform and promote the flow of capital between entrepreneurs and investors. This study identifies the investment evaluation criteria through literature review. The results of the study found out the 6 dimensions and 24 investment evaluation criteria. The 6 dimensions include "Management Team Information", "Marketing Information", "Financial Information", " R&D and Technology", " Production and Product Information" and "Intellectual Property Rights". We suggest that the future research can further identify the key investment evaluation criteria and understand the relationship between these criteria.

Keywords: *Entrepreneurial service, Blockchain, Investment evaluation criteria*

IAIC2019-123

The Application of Python to Processed Pineapple Product

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Abstract

Pineapple is the most popular fruit in Taiwan. However, the most significant issue that Taiwanese pineapple industry has been facing is the overproducing issue. To handling the overproducing issue, reproduce pineapples into processing product would be one of the options for pineapples planting corporation. However, reproduced pineapples into a higher value and benefits processing product need to be plane carefully.

In this paper, we will first describe a Web Crawler example written in python to capture the information of popular processed pineapple product in yahoo audition website. After that, we will capture the ten most popular processed pineapple products on yahoo audition website for one month then we will summarize the ten most popular processed pineapple products sold in yahoo audition website. The result of this paper will assist the company in understanding consumer preference for processed pineapple product. As a result, provide advice for corporation planning product strategy.

IAIC2019-124

To Develop Strategies for Plant Factory

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Abstract

Plant factory (PF), or a vertical farm, is an environment-controllable plant production facility, that gets rid of the limitations of agricultural resources and the environment and enables plants to be mass-produced throughout the year. Value Chain Analysis (VCA) is a powerful diagnostic tool that reveals possible problems in the value chain. TRIZ is a problem-solving, analysis and forecasting tool. The challenge faced by most plant factories today is to reduce costs and predict market and customer demand trends. VCA and TRIZ can be used to find solutions that can be implemented within the enterprise. In this paper, we demonstrate how to apply VCA and TRIZ in one of the PF problems. The problem for a small PF is the difficulty to develop and manage customers because of shortage of resources, and then we apply TRIZ to find solutions in this problem. When we want to reduce the difficulty of customer relationship management, we should spend more money and time to hire and train employee to manage customers. In TRIZ, “Reduce the difficulty” is the improvement point, and “Spend more resource” is the deterioration point. In order to solve the contradictions in this problem, we need to use the table of contradictions of TRIZ to develop the solution. For instance, we use “Principle 3, Local Quality” to develop the strategy, “Divide the area where the customer is located and assign regional business personnel,” and use “Principle 35, Parameter Changes” to develop the other strategy, ”Develop online customer management system.” Finally, we use VCA to get the activities in PF’s value chain that can implement the strategies. For example, the first strategy, “Divide the area where the customer is located and assign regional business personnel,” can be implemented by the primary activity, “Marketing and sales”, and the support activities, ”Human resources management” in PF’s value chain, while the second strategy can be implemented by the primary activity, “Marketing and sales”, and the support activities, ”Technological development.”

Keywords: *Plant factory, Value Chain, Value Chain Analysis, TRIZ*

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Again, we really appreciate your participation and contribution and hope to see you in State of Maryland, USA on 2020!

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