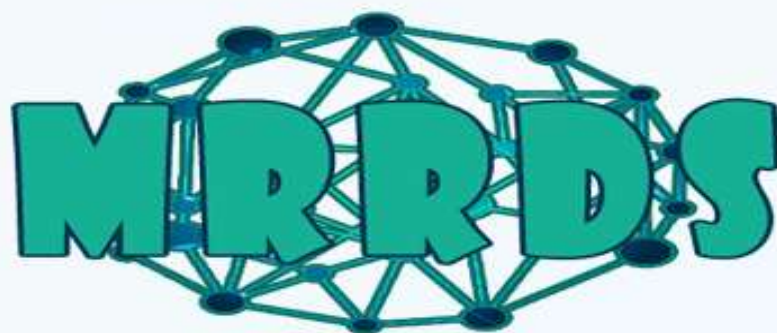


Osaka, Japan



Volume 01, Issue 07

July 26-27, 2018



MRRDS–Osaka, Japan

**International Conference on
Information Systems, Business,
Management and Social Sciences
(ISBMS)**

July 26-27, 2018

Osaka International Convention Center

Book of abstracts

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Office Address:

M2-17-01 Tower 2, Level 17 8trium
Bandar Sri Damansara,
52200 Kuala Lumpur, Malaysia
CONTACT: (+6) 03 6735 6566
EMAIL: contact@mrrds.education

Organizing Committee

1. Mr. Leon Yap

Conference Coordinator

2. Mr. Metin

Conference Coordinator

3. Ms. Petrel Qiu

Conference Coordinator

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Conference Chair Message

Dr. Hungxiz Li

International Conference on “Information Systems, Business, Management and Social Sciences (ISBMS)” serves as platform that aims to help the scholarly community across nations to explore the critical role of multidisciplinary innovations for sustainability and growth of human societies. This conference provides opportunity to the academicians, practitioners, scientists, and scholars from across various disciplines to discuss avenues for interdisciplinary innovations and identify effective ways to address the challenges faced by our societies globally. The research ideas and studies that we received for this conference are very promising, unique, and impactful. I believe these studies have the potential to address key challenges in various sub-domains of social sciences and applied sciences.

I am really thankful to our honorable scientific and review committee for spending much of their time in reviewing the papers for this event. I am also thankful to all the participants for being here with us to create an environment of knowledge sharing and learning. We the scholars of this world belong to the elite educated class of this society and we owe a lot to return back to this society. Let’s break all the discriminating barriers and get free from all minor affiliations. Let’s contribute even a little or single step for betterment of society and welfare of humanity to bring prosperity, peace and harmony in this world. Stay blessed.

Thank you.

Dr. Hungxiz Li
Conference Chair
MRRDS– 2018

Conference Schedule

DAY 01 Thursday (July 26, 2018)

Venue: Osaka International Convention Center

| | |
|---------------------|------------------------------------------------|
| 09:00 am – 09:10 am | Welcome Reception & Registration |
| 09:10 am – 09:20 am | Introduction of Participants |
| 09:20 am – 09:30 am | Welcome Remarks – Conference Coordinator MRRDS |
| 09:30 am – 10:00 am | Grand Networking Session and Tea Break |

DAY 01 Thursday (July 26, 2018)

Session I (10:00 am – 1:00 pm)

Session Chair: Mr. Leon Yap

Track A : : Engineering, Technology & Applied Sciences

| | | |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------|---------------------|
| CPITA-JULY-101 | Polyacrylonitrile Membranes with Innovative Lace Structure and Backed Selective Layer for Forward Osmosis Application | Ming-shen Chien |
| CPITA-JULY-102 | Learning Effects on a Manufacturing-Remanufacturing Inventory System with Backordering | Dr. Shih-Pin Chen |
| CPITA-JULY-106 | Influence on Phase Transformation in Selected Laser Melted and Subsequently HIP Treated CoCrMo Alloy | Young-Kyu Kim |
| CPITA-JULY-107 | Improved Grain Refinement in Solid-State-Welded STK400 Steel Tube | Gyeong-Woo Kim |
| CPITA-JULY-108 | Evaluation of Process Characteristics for Hot Forming Quenching Integrated Process With Al6061 Sheet | Dr. Chanjoo Lee |
| CPITA-JULY-109 | A Study on Flow Control of Rear Flange Parts for 34ton-class Composite Driving Device | Mincheol Park |
| CPITA-JULY-110 | A Study on precision drilling of CFRP for BEAM& HAT parts | Yunhyeok Lee |
| CPITA-JULY-111 | A Study on the Relationship between Hardness and Strain of Cold Forged Parts | Park Seok Hyeon |
| CPITA-JULY-116 | A Study of Injection Molding Technique with 3D Printed Polymer Core in Continuous Molding Cycles | Euichul Jeong |
| CPITA-JULY-117 | The Effects of Different Core Materials on Shrinkage Rate in Injection Molding Process | Sunghyun Shin |
| OSA-478-101E | Modelling of Oscillating Water Column Devices – Part II: Experimental Validation | Aitor J Garrido |
| NTEA78-102 | Self-Stabilizing Distributed Algorithm for Minimizing the Number of Discarded Late Messages | Prof. Dr. Jinho Ahn |

Lunch Break (01:00pm – 02:00 pm)

DAY 01 Thursday (July 26, 2018)

Session II (02:00 pm – 04:45 pm)

Session Chair: Mr. Leon Yap

Track B: Business, Economics, Social Sciences & Humanities

| | | |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|
| ISBMS-JUL-101 | Foreign Bodies, Local Spaces: Women as transnational labour in Singapore's sex worker industry at Geylang | Kevin S.Y. Tan |
| ISBMS-JUL-102 | Leisure for the Masses: Remapping Theatres and Entertainment Sites along the Tram Route of Hong Kong Island | Dr LAU Leung Kwok Prudence |
| ISBMS-JUL-104 | Exploring Team Performance: The Moderation of Team Justice | Yuan Hui Tsai |
| ISBMS-JUL-105 | A Preliminary Research on the Effect of Somatosensory Games on the Memory and Cognition of Elderly People with Dementia- Take a Day Care Center for the Elderly in Yunlin County for Example | Jiang Chou Yeh |
| ISBMS-JUL-106 | Study on the Development of an Assessment Tool for the Early Palliative Consultation Needs - Based on a Regional Teaching Hospital | Hong Mau Lin |
| ISBMS-JUL-107 | The Mixed Strategy to Improve Medical Staff's Awareness of Patient Safety Culture-Based on a Regional Teaching Hospital | ChiSheng Chang |
| ISBMS-JUL-108 | The effect of Executives Diversity and Innovative Sources on Innovation | Peng Yu Li |
| ISBMS-JUL-111 | Different Times: Changes in Transnational Marriages between Taiwanese Men and Southeast Asian Women | Jian Jhou Chen |
| TPMR78-106 & 106A | The Application of Emotional Development Theory to Hotel Intern's Career Choice Intention | Jinhee Jin & Minhoo Cho |
| TPMR78-109 | Disciplinary Convergence: Dialogues between Art and Archaeology | Fay Stevens |
| TPMR78-110 | Bank Lending, Liquidity Constraints and Liquidity Effects | Te-Tsun Chang |
| IRBEMSH-078-ANI101 | An Analysis of Purchase Factors of Smart Mobility and moderate Effect of Experience | KyungSang Lee |

Closing Ceremony (04:45 pm - 05:00 pm)

List of Conference Attendees

The following Scholars/ practitioners/educationist who don't have any paper presentation, however they will attend the conference as delegates & observers.

| Sr. No | Official ID | Name | Affiliation Details |
|---------------|-----------------------|-------------------------------|------------------------------------------------------|
| 1. | CPITA-JULY-104 | Okeke, Emmanuel Uwa | Eagles Global Group of Companies, South Africa |
| 2. | CPITA-JULY-105 | Akintola, Akinjide Olusope | Eagles Global Group of Companies, South Africa |
| 3. | TPMR78-107A | Johnson Joseph Olumuyiwa | General Management at Segi University in Malaysia |

DAY 02 Friday (July 27, 2018)

City Tour and Shopping Day

All respective guests are free to conduct their own sightseeing and tour. The second day of the event is reserved for this memorable purpose.

**Track A: Business, Economics, Social Sciences and
Humanities**

Foreign Bodies, Local Spaces: Women as transnational labour in Singapore's sex worker industry at Geylang

Kevin S.Y. Tan*

Abstract This article seeks to provide a critical examination of Singapore's largest and most well-known red-light district, better known to locals as Geylang. Situated on the fringe of the city centre, the area is home to several hundred state-licensed transient female sex workers who are drawn from neighbouring countries within the Southeast Asian region and beyond. In recent years, they include persons from Malaysia, Thailand, China and more recently, Vietnam. Housed within ageing semi-detached buildings serving as brothels along numerous "lorongs" (a local term for streets) that line the side of Geylang Road, they represent the mainstay of Singapore's legalized sex worker industry. As a result, the urban development or renewal of the Geylang district and its inhabited spaces have, over the years, also been inevitably affected by its close association with such an industry. At the same time, these women engaging in sex work form an invisible part of Singapore's transnational labour workforce, often reflecting the gendered social-cultural and economic inequalities within the societies they originated from. Their work, therefore, share many parallels with foreign workmen in Singapore who engage in low wage menial labour, because of the highly visceral and corporeal nature of their work, where they literally "put their bodies on the line". Like their male counterparts, they are seen as engaging in what is regarded as the "3-Ds" (dirty, dangerous and demeaning) of transnational migrant labour that form part of low-end globalization. Nonetheless, this article seeks to provide a more nuanced and balanced perspective by attempting to transcend polemical views that either stereotypically portray them as victims of exploitation or perpetrators of moral hazards.

Keywords: Singapore, Geylang, Transnational, Sex Worker, Migration

Singapore University of Social Sciences, Singapore

*E-mail: kevintan@suss.edu.sg

Leisure for the Masses: Remapping Theatres and Entertainment Sites along the Tram Route of Hong Kong Island

Dr Lau Leung Kwok Prudence *

Abstract This paper aims at mapping out a socio-history of entertainment in Hong Kong, with a focus on the buildings along the tram route of Hong Kong island. In the 1950s, large numbers of emigrants moved from Shanghai to Hong Kong to escape the turmoil of war, and settled in the North Point area along King's Road. This first wave of emigrants is said to have introduced a lot of Shanghai-style restaurants and barbershops to this area, as well as establishing the Sunbeam Theatre along the tram route as a landmark for Cantonese opera. Interesting, along the same road, the Empire Theatre (currently State Theatre) also opened in the 1950s, as the first deluxe theatre in the North Point district. Both theatres still remain today, experiencing similar issues in maintaining its function as a theatre, particularly recent in the case of the State Theatre. Not far from the tram station off Hennessy Road is the Lee Theatre, originally also showcasing Cantonese opera when opened in 1927. The building has long been redeveloped as a commercial building, with remnants of the Theatre's former decorations on the façade. However, it is not until the coastline was extended in the late 1940s that numerous new theatres opened in along the tram route in Causeway Bay and Wan Chai district, including Cathay Theatre, Capitol Theatre, Pearl Theatre, Jade Theatre and Roxy Theatre, indicating a flourishing of entertainment businesses in Hong Kong and the high demand of this form of leisure from the local society. It is a pity that these theatres are all now demolished, but a socio-history of entertainment along the tram route in Hong Kong are missing in academia, and in need of repositioning in the field. This paper will aim at suggesting conservations strategies for both demolished and existing buildings to recreate a socio-historical map of entertainment in Hong Kong. Building upon international strategies in conserving sites along tram routes, this research will therefore suggest and formulate improved directions for Hong Kong heritage policy in conserving not only individual theatres but broader areas of entertainment sites in a densely populated urban area.

Keywords: Architecture, Theatres, Cultural Heritage, Heritage Conservation, Social History

The Education University of Hong Kong, Hong Kong
*E-mail: plklau@eduhk.hk

Exploring Team Performance: The Moderation of Team Justice

Yuan Hui Tsai*¹, Chieh-Peng Lin², Jui-Yu Chen³, Chou-Kang Chiu⁴

Abstract This research bridges social cognitive theory and Turner's theory of social interaction to develop a model that explains how work teams in technology industry can be motivated to enhance team performance. This study proposes that team performance positively relates to collective efficacy via the full mediation of social interaction. Furthermore, justice positively moderates the relationship between collective humility and social interaction but negatively moderates the relationship between collective efficacy and social interaction. Lastly, managerial implications are provided.

Keywords: Technology Industry, Social Interaction, Justice, Humility, Collective Efficacy, Team Performance

¹Chihlee University of Technology, ^{2,3}National Chiao Tung University, ⁴National Taichung University of Education, Taiwan

*E-mail: tsaimalo@gmail.com

A Preliminary Research on the Effect of Somatosensory Games on the Memory and Cognition of Elderly People With Dementia- Take A Day Care Center for the Elderly in Yunlin County for example

Jiang-Chou Yeh^{1*}, Yi-Wen Huang², Bor-Wen Cheng³

Abstract This study adopted a quasi-experimental design in which purposive sampling was used. The study site was the National Cheng Kung University Hospital Dou-Liou Branch dementia daycare center, from which 30 patients with dementia who were ≥ 65 years old were recruited. During the study, subjects were randomly assigned to either the experimental or control groups. During the study, eight participants withdrew due to personal reasons; 22 subjects completed the study. The study spanned 12 weeks, from 21 September to 31 December 2017. The experimental group included four male dementia patients (76.25 ± 6.61 years), of which three had mild dementia and one had moderate dementia; and seven female dementia patients (80.14 ± 6.38 years), of which four had mild dementia and three had moderate dementia. In the control group, there were five elderly male dementia patients (80.8 ± 1.6 years), of which three had mild dementia and two had moderate dementia; and six female dementia patients (82.83 ± 8.93 years), of which three had mild dementia and three had moderate dementia. The present study employed an interactive drum-beating somatosensory game, “Taiko no Tatsujin.” The excitement from and activity prompted by the drum-beating somatosensory game were used to alleviate degeneration of cognitive functions and improve attention, coordination, reaction, and memory functions of the elderly.

Keywords: Preliminary, Research, Somatosensory Games

^{1,2,3} National Yunlin University of Science and Technology, Taiwan
*E-mail: QQ929010@gmail.com

Study on the Development of an Assessment Tool for the Early Palliative Consultation Needs - Based on a Regional Teaching Hospital

Hong-Mau Lin^{1*}, Sheng-Jean Huang², Yu-Tsung Tsai³, Yu-Shen Chen⁴, Bor-Wen Cheng⁵

Abstract The purpose of this study was to develop an assessment tool (Palliative Consultation Care Screening Tool, PCCST) to identify the end-of-life patients early, so that early consultation could be initiated to facilitate patient assessment and meet advanced care plan. Introduction: In the past decades, the awareness of "good death" has gradually risen, but there were no appropriate opportunities to talk about "Do Not Resuscitate" (DNR). At present, the end-of-life care is still hospital-based in Taiwan. The current practice by hospice wards alone are not enough to achieve this task, so it is better to establish a hospital-based palliative care model. All units of a hospital should be able to take care of dying patients and their families. Even if the palliative care has been extended from the hospital to the community, care workers are still trained under hospital-based program. Regardless of causes, all end-of-life patients should receive high-quality end-of-life care. Methodology: In this study, we prospectively enrolled 27,141 hospitalized patients from January 1, 2010 to December 30, 2011. PCCST scores were assessed at admission of the patient by in charge nurse staffs. The collected data were analyzed by SPSS software statistics, descriptive analysis, paired T test, chi-squared test and Pearson's correlation, ROC curve analysis, linear regression and Logistic regression were applied. Results: After a follow-up period of 6 years and 6 months, a total of 3,818 enrolled cases died, and the scores from PCCST correlated well with the mortality rate. ROC curve showed the optimal cut point for the possibility of death at score 2.5 points. The optimal cut point for the possibility of end-of-life at PCCST score 3.5. Risk factors of "the possibility of death" included male sex (odds ratio : male vs. female 1.40), age (odds ratio : 1.02) and PCCST score (odds ratio 1.26). Risk factors of "the possibility of end-of-left" included sex (odds ratio : male vs. female 1.24), and PCCST score (odds ratio: 1.29). The prediction equation of life expectance when the patient died is "life expectancy (days) =515.509+ (-41.313) *score. Conclusion: According to the results, the PCCST can be used as a suitable tool for end-of-life assessment, and helps identify end-of-life patients early. The tool is user-friendly and could be extended to emergent room or home care.

Keywords: End-Of-Life, Palliative Care, Futile Medical Care, DNR, Palliative Care Consultation Screening Tool

^{1,2,3,4,5} National Taiwan University Hospital, Yun-Lin Branch, Taiwan
*E-mail: hmlinyl@gmail.com

The Mixed Strategy to improve medical staff's awareness of patient safety culture-Based on a Regional Teaching Hospital

ChiSheng Chang*

Abstract \“To Err is Human: Building a Safer Health System\”, proposed by The Institute of Medicine (IOM, 1999), brought attention of all medical institutions to the issues of patient safety. Patient safety culture is a reflection of the persistence and behaviors of institutional personnel concerning safety. The Hospital Patient Safety Culture Survey in Taiwan was developed according to the Safety Attitude Questionnaire designed by Bryan Sexton (2008); patient safety culture has been investigated by participating hospitals since 2009, and has been used as benchmarks of annual patient safety initiatives in Taiwan. Since 2010, dedicated patient safety staffs are designated for every unit at Chi Mei Liouying hospital (case hospital) to examine and manage the reported cases of patient safety incidents and share their management experience through the meeting of unit patient safety staff. In addition to organizing regular patient safety courses, experts are invited to give advice on root cause analysis (RCA) and help to identify the root causes of patient safety incidents. What is more, an online notification system at the case hospital was designed and implemented, and incentives are also provided to encourage the reporting of patient safety incidents. The enhanced bonus is expected to be available, depending on the severity of reported cases and the implementation effectiveness of the improvement in the performance of interdisciplinary teams. The results are regularly tracked and improved by the Patient Safety and Quality Assurance Committee. Moreover, countermeasure to provide feedback about the Patient Safety Culture Survey (PSCs) is as follows. Since 2013, rewards were given to the units with the response rate reaching 90% or higher. Meanwhile, the person in charge will provide the feedback of performance analysis to the units. In 2017, a total of 12 team review meetings for cases of severity assessment code II incidents and above were held with the aims of performing root cause analysis (RCA). In the same year, a total of 1,675 people from the census in hospital units responded to online survey (with a response rate of 94.7%). The percentage of each dimension is higher than the average of peer-to-peer medical institutions, among six dimensions of which higher than the 75 percentile, which are unit safety culture at 65.1% (P75 = 63.5%), job satisfaction at 58.6% (P75 = 57.6%), feelings towards the management at 62.3% (P75 = 58.3%), working condition at 66.2% (P75 = 61.6%), work-life balance at 80.2% (P75 = 74.4%), resilience at 37% (P75 = 32.2%), teamwork at 66.2 % (P50 = 61.1%), and stress perception at 56.4% (P50 = 53.1%). The research findings show that the case hospital effectively develop patient safety culture by encouraging adverse event reporting, organizing meetings and discussions among cross-disciplinary specialists, as well as training prospective seed employees regarding patient safety. On the other hand, the employees' awareness of patient safety is enhanced from long-term support of senior executives. The effectiveness of implementation proves to be evident from a national survey of patient safety culture.

Keywords: Unit Patient Safety Officer, Patient Safety Culture Survey

National Taiwan University Hospital, Yun-Lin Branch, Taiwan
*E-mail: eachi1001@gmail.com

The Effect of Executives Diversity and Innovative Sources on Innovation

Peng Yu Li*

Abstract This study investigates the moderating effect of R&D commitment and internationalization for the relationship between the executive educational diversity and firm innovation. According to the mixed results of prior empirical studies, this study considers the moderating effect of R&D commitment and foreign expansion on the relationship between educational diversity and firm innovation. Applying the upper echelons theory, we explain how the executive diversity affects the level of innovation of the firms. Linear regression is applied to investigate the proposed relationship and get results based on a sample of 114 manufacturing firms. We found educational diversity was positively associated with innovation and R&D commitment positively moderated the relationship between educational diversity and firm innovation, while foreign expansion negatively moderated the relationship between educational diversity and firm innovation.

Keywords: Diversity, Innovative Source, and Innovation

Fu-Jen Catholic University, Taiwan
*E-mail: pyli@mail.fju.edu.tw

Different Times: Changes in Transnational Marriages between Taiwanese Men and Southeast Asian Women

Jian Jhou Chen*

Abstract Transnational marriages between Taiwanese men and Chinese/Southeast Asian women has become a common phenomenon for nearly two decades. At present, the number of people in said marriages totals more than 500,000. Transnational marriages between Taiwanese men and Southeast Asian women attract attention because they display the characteristics of exchange-type intermarriage. The number of transnational marriages between Taiwanese men and Southeast Asian women since the mid-1990s has shown the following trend: increase --> decrease --> no increase/decrease. Specifically, such marriages became common when Taiwan prospered economically in the mid-1990s; increased annually between 1998 and 2002; decreased between 2004 and 2006; and remained steady between 2006 and 2016. According to institutional theory, when a transnational marriage occurs in a family, the probability that the rest of the other family members enter a transnational marriage increases. Structuralism also stipulates that people who have a greater chance of meeting foreigners in their work environments or social networks have a higher chance of entering into a transnational marriage. This study hypothesized that the ratio of Taiwanese men and Southeast Asian women who marry via marriage agencies is gradually decreasing, whereas that of Taiwanese men and Southeast Asian women who marry for love or through introductions by their friends and relatives is gradually increasing. Institutional theory also posits that for transnational couples, the ratio of their relatives also entering a transnational marriage increases over time. These changes lead to changes in the age gap between spouses. In other words, as channels for transnational marriages evolve from marriage agencies to network-based channels, the resemblances in characteristics between transnational marriages and exchange-type intermarriage decrease and age gaps between spouses may also decrease. In this study, 307 Southeast Asian women who married Taiwanese men and who now lived in Kaohsiung or Nantou were selected as the study participants. An analysis performed showed the following results: (a) Over time, channels for transnational marriages have evolved gradually from marriage agencies to individuals' social circles or through introductions by their friends and relatives; (b) education level was negatively correlated with transnational couples who married via marriage agencies; and (c) the age gap between transnational couples was highest if they were introduced to each other through marriage agencies, and the lowest if they met each other on their own. As transnational marriage channels change, the characteristics of transnational marriages between Taiwanese men and Southeast Asian women have also changed.

Keywords: Transnational Marriage, Transnational Marriage Models

Kaohsiung Medical University, Taiwan

*E-mail: jjchenkm@gmail.com

Disciplinary Convergence: Dialogues between Art and Archaeology

Fay Stevens*

Abstract The notion of a transdisciplinary perspective and practice has gained recent attention as an addition to ‘inter’ and ‘multi’ disciplinary modes of working and thinking. At its broadest definition, a transdisciplinary approach to research and practice is conducted by practitioners from different disciplines working jointly to create new conceptual, theoretical, methodological and translational innovations and ways of thinking. This is seen as a move beyond discipline specific approaches in order to address a shared problem or interest. In this paper I critically consider these inter/multi/trans disciplinary modes of engagement and consider how certain dialogues between art and archaeology open up new avenues of knowledge and understanding. I will link this to my current research into the theory of ‘entanglement’ and present a series of ideas as to how this enables discourse on the convergence of disciplines, the exploration of ideas and the development of intellectual thought.

Keywords: Disciplinary Convergence, Dialogues, Art and Archaeology

University of Notre Dame (U.S.A.), England

*E-mail: Fay.Stevens.49@nd.edu

Bank Lending, Liquidity Constraints and Liquidity Effects

Te-Tsun Chang*

Abstract The current paper is to develop a general equilibrium model with money, banking, and credit to study the monetary transmission mechanism, and liquidity effects. The model of this project is based on Lagos and Wright (2005) that the role of money is to facilitate transactions, and agents trade with each other, not merely against their budget constraints. The project is also concerned with incentive problems in collateral markets and banking. We follow the framework of Williamson (2016b) that banks make loans and receive deposits, transform assets and process information. In other words, banks are not just stories but features real-world characteristics. The loan contracts of households and banks face liquidity constraints because of the pledgeability of collaterals. And such liquidity constraint matters for the liquidity effect, even with the zero lower bound.

Keywords: Liquidity Effects, Money, Banking, Credit

National Chi-Nan University, Taiwan
*E-mail: brightside2x@gmail.com

The Application of Emotional Development Theory to Hotel Intern's Career Choice Intention

Jinhee Jin*

Abstract The purpose of this study is (1) to analyze the effect of psychological independence to self identity, (2) the effect of psychological independence to internship satisfaction, (3) the effect of psychological independence to hotel career choice intention, (4) the effect of self identity to internship satisfaction, (5) the effect of self identity to hotel career choice intention, (6) the effect of internship satisfaction to hotel career choice intention. The researcher constituted the conceptual model and will use the regression analysis and structural equation modeling to test the hypotheses. In total, 350 hotel interns, who are participating in the overseas hotel internship, will survey the questionnaire in this study. The expected result of this study as follows. (1) Psychological independence will effect on self identity, (1-1) functional independence will have a positive effect on self identity, (1-2) attitudinal independence will have a positive effect on self identity, (1-3) emotional independence will have a positive effect on self identity. (2) Psychological independence will effect on internship satisfaction, (2-1) functional independence will have a positive effect on internship satisfaction, (2-2) attitudinal independence will have a positive effect on internship satisfaction, (2-3) emotional independence will have a positive effect on internship satisfaction. (3) Psychological independence will effect on hotel career choice intention, (3-1) functional independence will have a positive effect on hotel career choice intention, (3-2) attitudinal independence will have a positive effect on hotel career choice intention, (3-3) emotional independence will have a positive effect on hotel career choice intention. (4) Self identity will effect on internship satisfaction. (5) Self identity will effect on hotel career choice intention. (6) Internship satisfaction will effect on hotel career choice intention.

Keywords: Hotel Intern, Psychological Independence, Self Identity

Hanyang University, Korea
*E-mail: jenny93@hanyang.ac.kr

**Track B: Engineering, Technology, Computer and
Applied Sciences**

Polyacrylonitrile Membranes with Innovative Lace Structure and Backed Selective Layer for Forward Osmosis Application

Ming-shen Chien*

Abstract High-performance and facile-production thin-film composite membranes for forward osmosis (FO) application are prepared and studied in depth in this work. The innovative membranes consist of efficient polyacrylonitrile (PAN) supportive layer and dense polyamide selective layer. This process used two coagulation baths, the first bath containing 1-Methyl-2-pyrrolidone (NMP) and water and the second containing water, for the fabrication of FO membranes. FO performance of the fabricated membranes can reach as high as 10 LMH in water flux and lower than 5 gMH in reverse salt flux using 1 M NaCl and DI water as draw solution and feed solution, respectively. The enhanced water flux is resulted from the “lace” structure with interconnected pores that significantly reduce internal concentration polarization by varying the NMP/water ratios of the first bath in the wet phase inversion process. Unlike most other studies, the polyamide selective layer of the membranes was designed to form on the back side of the supportive layers after phase inversion, which serves as a flatter and proper pore size platform for better adhesion, and therefore exhibits lower reverse salt leakage. Such combination of membrane design has proved to be a feasible approach to FO development while giving a potential to commercial application in the near future.

Keywords: Polyacrylonitrile Membranes, Innovative Lace, Structure

Department of Materials Science and Engineering, National Tsing Hua University, Taiwan
*E-mail: nhtai@mx.nthu.edu.t

Learning Effects on a Manufacturing-Remanufacturing Inventory System with Backordering

Dr. Shih-Pin Chen*

Abstract This paper investigates the learning effects on a manufacturing-remanufacturing inventory system with backorders allowed. A dynamic model is constructed for jointly determining sale and recycling prices and production/remanufacturing time points such that the total profit per unit time is maximized. Sensitivity analysis and a comparison for the effectiveness of learning effects between production and remanufacturing are also conducted. We find that the total net profit per unit time varies irregularly but has a decreasing (increasing) trend when the learning effect in the manufacturing (remanufacturing) rate increases. From a long-term perspective, the investment for raising learning effects in remanufacturing is more profitable than that in manufacturing.

Keywords: Inventory; Learning Effect; Closed-Loop Supply Chain Management

Business Administration, National Chung Cheng University, Taiwan
*E-mail: chensp@ccu.edu.tw

Influence on Phase Transformation in Selected Laser Melted and Subsequently HIP Treated CoCrMo Alloy

Young-Kyu Kim*

Abstract To evaluate the development of microstructures and mechanical properties on selected laser melted and subsequently hot isostatic pressing (HIP) treated CoCrMo alloy, this work was carried out. Selected laser melting (SLM) as an additive manufacturing method was conducted at a scan speed of 400-800 mm/s, and CoCrMo powder with a size of 10 - 60 μm as a material was selected. Hereafter, subsequent HIP treatment was conducted at a temperature of 1,250 $^{\circ}\text{C}$ under the pressure of 1,500 bar for 2 hours. In order to analyse the grain boundary characteristic distributions (GBCDs) developed during SLM and HIP treatment, electron backscattering diffraction (EBSD) method was introduced. Also, Vickers microhardness as an evaluation method of mechanical properties was introduced. As a result, increased scan speed during the additive manufacturing led to the significant grain refinement from 58 μm at 400 mm/s to 27 μm at 800 mm/s, which resulted in the increased Vickers microhardness. Meanwhile, the application of HIP treatment on selected laser melted material in contributed to the phase transformation from hcp to fcc type, which induced the homogeneous grain shape and size. In addition, MC carbides dispersed at the grains and grain boundaries were mainly effective to develop the friction strength of the material.

Keywords: Phase, Transformation, Selected Laser Melted

Department of Welding and Joining Science Engineering, Korea
*E-mail: steven920@naver.com

Improved Grain Refinement In Solid-State-Welded STK400 Steel Tube

Gyeong-Woo Kim*

Abstract We evaluate the properties of solid-state-welded STK400 steel tube in terms of the relationship between microstructures and mechanical properties. As a solid-state-welding process, the friction welding which is suitable for tube and rod type metals was introduced in this study. Prior to this, STK400 steel tube with a diameter of 60.5 mm, which has a thickness of 3.3 and 2.2 mm, was prepared by length of 170 and 70 mm, and friction welding was conducted at a rotation speed of 1,600 rpm and upset time of 3 - 7 sec., respectively. To analyse the grain boundary characteristic distributions (GBCDs) such as grain size, shape, misorientation and phase distributions for the welded materials, electron backscattering diffraction (EBSD) method was introduced. As a result, the decrease in welding time (3 sec.) led to the notably increased grain refinement so that average grain size was refined from 15.1 μm in base material to 14.3 and 4.5 μm in welded zone (welded during 7 and 3 sec., respectively). In addition, the welded zone consists of fully equiaxed grains due to dynamic recrystallization occurred by friction heat and metallic flow during welding. These refined grains achieved the significantly enhanced microhardness (30% higher) and a slightly higher yield and tensile strengths relative to the base material, respectively. In particular, all the tensile tested specimens showed the fracture aspect at the base material zone not at welded zone, which means the soundly welded state at all conditions.

Keywords: Improved, Grain Refinement, Solid-State

Joining Science Engineering, Chosun University, Korea
*E-mail: gyengwoo4886@gmail.com

Evaluation of Process Characteristics for Hot Forming Quenching Integrated Process With Al6061 Sheet

Dr. Chanjoo Lee*

Abstract Heat-treatable 6000 series aluminum alloys are widely used for lightweight material in automotive industry because of their high strength-to-density ratio, workability, and excellent comprehensive mechanical properties. T6 heat treatment of 6000 series aluminum alloys is well-known as a process that can maximize its strength. However, in order to secure formability, T4 heat treated sheet having lower strength than T6 heat treatment are generally used for automobile parts. The hot forming quenching process(HFQ) on aluminum alloys has recently been developed as a new process. In this novel process the aluminum sheet are heated to its solution heat treatment(SHT) temperature for maximizing its ductility and formability. sheet are hot formed and quenched in cold die. The heated material is formed into the desired shape and rapidly cooled in the die. The HFQed part using heat-treatable aluminum sheet can be aged to obtain the target strength with T6 heat treatment. As a result, excellent hot forming properties, minimum spring back and uniform mechanical properties can be achieved through the aluminum hot forming process. The purpose of this study is to evaluate the forming characteristics of aluminum 6061 sheets in a hot forming quenching process. Unlike the conventional hot forming quenching process, which directly forms the material heated above the SHT, the process involving the hot forming after the primary cooling to a specific temperature is studied in this study. The spring-back characteristics are investigated by U-bending model. And the drawability are evaluated by LDR test.

Keywords: Hot Forming Quenching, Heat-Treatable Aluminum Alloy

Korea Institute of Industrial Technology, Korea
*E-mail: cjlee80@kitech.re.kr

A Study on Flow Control of Rear Flange Parts for 34ton-class Composite Driving Device

Mincheol Park*

Abstract The composite driving device is a component that moves forward and backward of a crawler type construction machine. Also, it is a complex and compact structure system combined with hydraulic counter balance valve, axial piston type hydraulic motor part and planetary type gearbox, and it is required various functions, high rigidity and high reliability. Recently, the demand for excavators of 29 to 34 ton class is increasing in large-scale plant industry in overseas markets. It is necessary to study the driving device which is a component of the excavator. The rear flange which is a component of composite driving device is designed to the shape of the internal flow path. The problem of generation of vibration and noise has emerged as the size increases. Generally, vibration and noise are caused by pressure pulsations. Therefore, research to minimize pressure pulsation is needed. In this paper, pressure pulsation was analyzed according to the design parameters of the internal flow path shape of rear flange. The finite element method and the orthogonal arrays table were used to determine the optimal shape. Design variables were selected as 3 factor 3 level, the parameters were inlet area, outlet area and radius of curvature. CFD analysis was performed according to the orthogonal array table. Finally, the design conditions to minimize the pressure pulsation were obtained.

Keywords: Pressure Pulsation, Orthogonal Array, FE-Anaylsis

Gyeongsang National University, Korea
*E-mail: mcpark0070@naver.com

A Study on Precision Drilling of CFRP for BEAM& HAT Parts

Yunhyeok Lee*

Abstract Recently, the demand for lightweight and durable materials is increasing due to the growth and development of the industry. Especially, CFRP (Carbon Fiber Reinforced Plastics) is used in a variety of industrial fields such as aerospace and automobiles where high specific stiffness and specific strength are required compared with metallic materials. However, CFRP has several problems, such as delamination around the inlet and outlet holes at drilling, fiber separation, and tearing on the drilled surface. Optimal machining conditions are required to prevent machining defects. In this paper, optimum processing conditions for manufacturing BEAM and HAT vertical used as main parts of the aircraft's middle body were decided. Conventional studies to prevent CFRP machining defects have determined optimal machining conditions based on tool shape (point angle), material, feed rate and rotation speed(RPM). BEAM & HAT vertical part, considered in this paper, is machined with sintering of diamond drill tool with excellent wear resistance. However, BEAM & HAT vertical part machining defect occurred under conditions of set by feed rate and rotation experienced person. Therefore, processing defect analysis of feed speed and rotation speed is required. The experiments were carried out by selecting feed rate and rotational speed as variables. The shape around the inlet and outlet holes at drilling according to the feed speed and rotation speed was analyzed. The microscope used to verify the machined CFRP surface. As a result of the analysis, optimum processing conditions could be obtained.

Keywords: CFRP, Drilling, Optimum Condition

Gyeongsang National University, Korea
*E-mail: dldbsgur0518@naver.com

A Study on the Relationship between Hardness and Strain of Cold Forged Parts

Park Seok Hyeon*

Abstract The hardness of each part of the parts is different due to the uneven strength and hardness of the initial material during cold forging. This is not only interrupt the continuous process in the forming process but also causes a problem that the mechanical properties of the desired parts are obtained. Therefore, in this study, we compared the Vickers hardness data with the effective strain through FEM(Finite Element Method). By analyzing the relationship between Vickers hardness and effective strain, we tried to predict the hardness of parts in cold forging.

Keywords: Hardness, Effective Strain, Cold Forging

Mechanical Engineering, Dong-A University in Republic of Korea, Korea
*E-mail: Parksh9204@naver.com

A Study of Injection Molding Technique With 3D Printed Polymer Core in Continuous Molding Cycles

Euichul Jeong*

Abstract In this paper, a study was performed to fabricate hundreds of injection molded plastic products with a conventional 3D printing technique. Polymer cores were designed and fabricated to investigate the effects of 3D printed mold material on injection molding characteristics due to low elastic modulus and thermal conductivity. To monitor temperature variation during injection molding cycles, cavity temperature sensor was installed in the polymer core. The internal temperature of metal and polymer core during cycle were compared according to application of cooling system in injection molding experiments. The variation in the internal temperature of polymer core and dimensions of the molded specimen were also measured. It was shown that the application of proper cooling system in polymer core could be enable to maintain the mold temperature within 2°C and dimensional accuracy of less than 1% over 200 continuous molding processes.

Keywords: Polymer Core, Injection Molding, 3D Printing

Dankook University, Korea
*E-mail: euicha0817@kitech.re.kr

The Effects of Different Core Materials on Shrinkage Rate in Injection Molding Process

Sunghyun Shin*

Abstract In this study, comparisons of shrinkage rate for injection molded products between polymer core and metal core were performed to investigate the effects of the core materials on dimensional accuracy of part thickness. Powder bed fusion method was used to fabricate the polymer cores. And the metal core was also fabricated with a conventional machining process. However, the 3D printed core material of PA2200 has lower stiffness and thermal conductivity compared with the metal core material of tool steel, cooling time of the polymer core was adjusted longer than that of metal core in injection molding experiment. The other remaining processing conditions such as injection, packing are identical. The thickness of the injection molded products were measured at regular intervals from the gate position and the shrinkage rate of the products were calculated in relation to the thickness of the fabricated cores. As a results, thickness shrinkage rate with the 3D printed polymer cores was higher than 2.23% average compared to the metal cores. In the case of metal core, thickness shrinkage was occurred at the further points from the gate, on the contrary, in the case of polymer core showed reversed aspect.

Keywords: Injection molding, Polymer core, Shrinkage

Dankook University, Korea
*E-mail: shinstar92@kitech.re.kr

Modelling of Oscillating Water Column Devices – Part II: Experimental Validation

Izaskun Garrido*¹, Jon Lekube², Amparo Villasante³

Abstract The European Energy Road Map 2050 and the Spanish Renewable Energies Plan for 2011-2020 are promoting the use of renewable energies as a necessary path to achieve the greenhouse gas reduction target necessary to avoid the rising global warming, and in particular, the use of Ocean Energy. Within the different types of on-shore wave-based energy devices, Oscillating Water Column (OWC) converters are one of the more widely used ones. An OWC plant is basically composed by a capture chamber coupled to a turbo-generator module. This paper deals with the model implementation of on-shore OWC wave energy power devices. The model is parameterised and validated for the particular case of Nereida MOWC wave power system using ad-hoc real data from Mutriku's power plant.

Keywords: Modelling, Wave Energy, OWC, Capture Chamber

University of the Basque Country (UPV/EHU), Spain
*E-mail: aitor.garrido@ehu.es

Self-Stabilizing Distributed Algorithm for Minimizing the Number of Discarded Late Messages

Prof. Dr. Jinho Ahn*

Abstract Generally, users of distributed group communication systems require getting as many messages as possible in their cause-effect order within the earliest deadline among them. Algorithms to hold this desirable feature should maintain each message broadcast to a group into the volatile storage of every group member. Also, they have to enable in-transit or lost predecessors of each received message to be taken from another group member as fast before its deadline as possible. In this paper, an effective broadcast algorithm is introduced to ensure inter-message causality, highly reduce late message discarding rate and improve responsiveness. This algorithm may stabilize the ratio of the number of delivered messages satisfying causal broadcast order and message deadline constraints together over the total number of sent messages. This feature can result in greatly rising up the opportunity for group members to obtain the predecessors of each message they have received, but not delivered yet, from its sender before the deadline. The self-stabilizing algorithm may help each group member locally make correct decisions with consistent information obtained from the messages even in soft real-time constrained environments.

Keywords: Self-Stabilization, Distributed Algorithm, Broadcast Communication

Kyonggi University, Korea
*E-mail: jhahn@kgu.ac.kr, jhahn@live.co.kr

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